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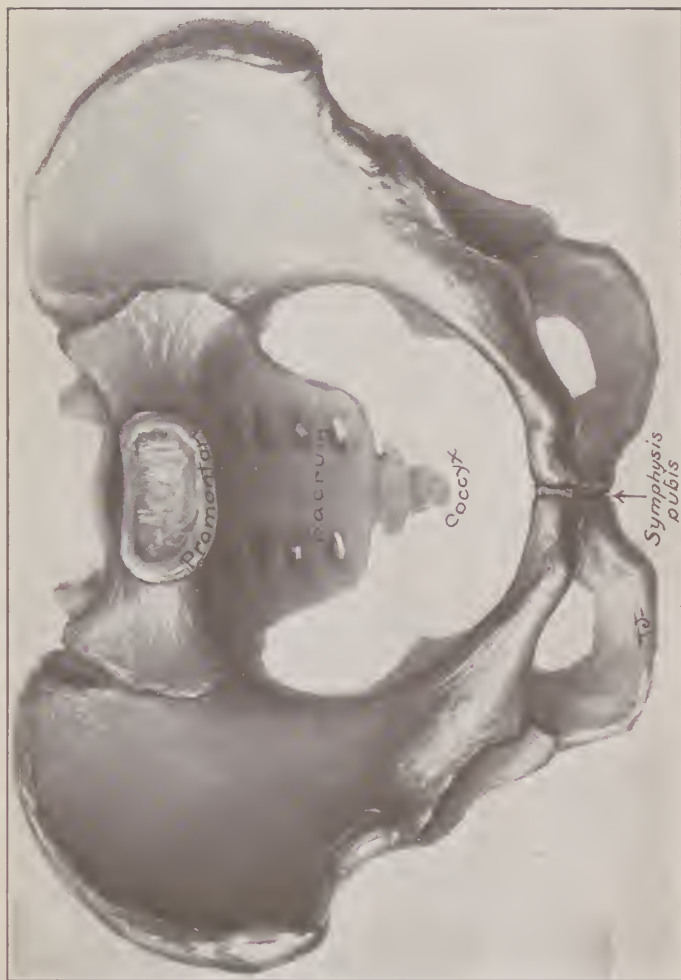
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Fig. 1



Female Pelvis.

OBSTETRICAL NURSING

A MANUAL FOR NURSES AND STUDENTS AND
PRACTITIONERS OF MEDICINE

BY

CHARLES SUMNER BACON, Ph.B., M.D.

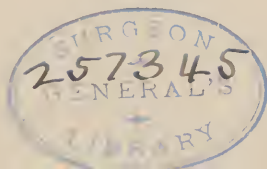
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no. 2.

TO

MY BEST COUNSELLOR AND FRIEND

MARIE ROSTHORN BACON

THIS LITTLE BOOK

IS GRATEFULLY DEDICATED

PREFACE TO THE SECOND EDITION.

THE chief changes in this edition consist in additions to the chapter on Embryology, where figures have also been added to aid in giving a better idea of the early development of the embryo and fetal adnexa, in the addition of suitable descriptions of certain obstetrical operations and procedures that have come into use in recent years and in the elimination of material that was considered of less value to nurses or that they could obtain from other sources.

Obstetrics as a science considers the physiological and pathological changes in woman during pregnancy, labor and the puerperium, and as an art it has to do with the supervision and care of the reproductive functions in woman and especially with assistance during labor. The obstetrical art includes the supervision and assistance usually given by the physician and the more detailed duties performed by the obstetrical nurse.

The obstetrical nurse should know as much of the science of obstetrics as is necessary for the intelligent comprehension of the rules of her art. It is believed that the incorporation of the scientific basis for the rules will increase instead of detract from the practical character of the book.

In choosing subjects, particularly in dystocia and other pathological conditions, it has not been forgotten that the nurse is the physician's assistant and should take responsibilities only when necessary. Certain responsibilities, however, she must assume. She may be alone with the patient at delivery, and she might have to contend with a postpartum hemorrhage. Hence such subjects are discussed more extensively than would be the case could we strictly limit the functions of the nurse to assistance.

The lack of a sufficient supply of nurses has led to a demand in some quarters for a lower qualification standard for entrance to the training schools and a shorter course of training to supply a larger number of nurses. On the other hand the movement has increased in force for a higher standard for entrance and a better and more scientific training to supply a higher grade of nurses. To adapt a text-book or manual to both classes is not impossible. For the nurse who has had only a two years' training it is necessary that the manual be very practical and go into details but this does not harm the student or nurse of greater attainments. The latter, however, demands that a manual on obstetrical nursing must present the subject in a scientific manner and with sufficient completeness to satisfy her intellectual cravings. A book that present the science of obstetrics satisfactorily is also none too good for the less trained nurse. At first, indeed there will be some things too difficult for her understanding but as she progresses in her work she will be glad to find answers to questions that will arise that she would not find in a primer.

This manual is also designed for medical students and practitioners who desire to know the details of the work of their assistants. Anything less than an accurate presentation of the scientific part of the subject would be to them unacceptable.

Any fear that a nurse might "know too much" and become dangerous because of a discussion with her of embryology, toxemia of pregnancy, mechanism of labor or pathology of the puerperium is obviated, by a constant insistence on the fact that her function is that of responsible assistance.

C. S. B.

CHICAGO, 1924.

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OBSTETRICAL NURSING.

CHAPTER I.

INTRODUCTORY.

A NURSE'S success or failure depends not only upon her knowledge of disease and its complications and the proper way to manage them, but quite as much upon her common-sense and tact in dealing with people and her ability to adapt herself to circumstances. When a nurse leaves the hospital and enters upon private nursing she finds the conditions quite different from those in which she has been trained. Sometimes her patient is not tractable. When a patient goes to a hospital she assumes that she must adapt herself to the regime already instituted and acquiesces in all the nurse's directions. In her own home she does not so easily lay aside her authority and the nurse finds it necessary to adopt other measures in carrying out the directions of the physician than those she is accustomed to use in the hospital. Moreover, the household arrangements must be taken into consideration. She has to deal with one or more servants and must be careful not to cause any disturbance. She frequently has to manage not only her patient, but also her patient's relatives who may have more or less authority in the house. Often she has to put up with unsatisfactory facilities for doing her work as she has been accustomed to perform it. In short, she finds private nursing and hospital nursing so different that she is often discouraged over her difficulties and mistakes.

If she has the will and tact she will soon overcome these

difficulties, provided she has the proper foundation of a good training in the work she is called upon to do. It is the object of this introductory chapter to call attention to certain obligations or duties which a nurse owes to herself, to her patient, and to the attending physician, which, when duly appreciated and regarded will smooth over many of the difficulties and bring her a quicker and greater measure of success.

The rules of conduct based upon these duties apply more or less to all nursing. Obstetrical nursing differs from other nursing in the fact that the obstetrical nurse has to care for two patients, the mother and the child. Her patients, while helpless, are generally not sick. Her duty is to preserve the health of her patients instead of to cure them. She is generally engaged beforehand, and is the choice of her patient or her physician. If she gives satisfaction she is the recipient of much gratitude, and her success in her calling is assured. It not infrequently occurs that a nurse fails to satisfy her patient or her physician, and yet she is quite unconscious of the reasons for her failure. It is not uncommon for her in such cases to assume that her patient or the physician, or both, dislike her or fail to appreciate her because of some whim or unjust prejudice against her. A careful study of some of the following suggestions may lead her to clear up her ideas and discover where she can improve.

As a result of the satisfactory development of the nursing profession in recent years the practical and ethical rules of conduct have been so well formulated and inculcated that most or all of these suggestions have become a fundamental part of the nurses equipment. Since this book, however, may be used by some who have not had the advantage of a training in the best modern schools of nursing and since the physician's confirmation of the teaching of the school superintendent or supervisor can only emphasize its importance the following observations cannot be considered useless or obsolete.

Duties to Self.—The nurse's chief duty to herself is the care of her health. Without health she not only suffers and risks her future career, but she is unable properly to care for

her patient. No one who is not strong and free from all constitutional or local disease should attempt nursing as a calling. If a nurse contracts a chronic disease after she has begun her work the question of giving up her profession becomes a very important one and must be decided by careful study in each individual case. Certain diseases are absolutely prohibitive. No nurse who has consumption, for example, has a right to continue her work. Syphilis and epilepsy are also examples of chronic diseases which absolutely disqualify a nurse. Certain pelvic diseases may greatly limit a nurse's usefulness. If a nurse has very painful menstruation, so that she is hardly able to be out of bed for two or three days, she is certainly not in a condition to care properly for her patient. Acute infectious diseases disqualify a nurse, of course, until she has recovered. An obstetrical nurse, in particular, must avoid all infection both on account of the mother and the child. No nurse should think of going to an obstetrical case until she has entirely recovered from scarlet fever, measles, erysipelas, etc. The greatest difficulty in deciding what to do arises in such affections as sore throat, colds, and attacks of influenza or grip. Should a nurse assume charge of a case of obstetrics or remain with a case if she has an ordinary tonsillitis or bronchitis? Ordinarily there is here much too great laxness of judgment. In every such case the nurse should consult the attending physician and be guided by his advice. If she remain in attendance she should at least take all possible care to avoid infecting her patients.

As a means toward the preservation of her health, she must attend to the regulation of her food and drink, care of her person, her clothing, sleep, and exercise.

The kind of food and its preparation will, of course, vary in different houses. Generally she will have no difficulty in obtaining a sufficient amount of good, wholesome food. A nurse has no right to be whimsical in her diet, and should not cause any unusual disturbance in the kitchen by asking for uncommon dishes. If she needs, during the day or night, an extra lunch, it is perfectly proper that she should ask for it in case it is not provided. A cup of hot milk is one of

the best lunches that can be taken, as it is both a stimulant and a food. Sometimes, in emergencies, which often occur during the labor, meal times are very irregular. At such times a cup of hot milk is also very valuable.

Intimately connected with the question of eating is the proper care of the mouth, stomach, and bowels. Good teeth and a good stomach are specially valuable when there is a lack of good food. A decayed tooth is not only a source of suffering but also a cause of improper nourishment and ill health. Bad teeth and a disordered stomach also cause a bad breath, which is a very serious failing in a nurse. It is, indeed, so important that it practically prevents a nurse from caring for a sensitive or well-bred patient. A nurse should always keep her teeth in good condition. Upon the slightest sign of trouble she should consult her dentist. Even if she has no toothache it is well for her to consult her dentist, every year at least, to be certain that no decay is developing insidiously. She should, of course, use her brush and powder morning and night, and wash out the mouth with some mild antiseptic wash after each meal.

If a coated tongue, eructation of gas, or regurgitation of food or feeling of pressure over the stomach after eating indicate a disturbance of that organ, she should make a vigorous effort to improve her digestion. Care of her diet, avoidance of indigestible foods, fried dishes, etc., will be the first measures to suggest themselves. A cup of hot water taken before meals will often improve the digestion. A regulation of constipated bowels is often important. If this care is not sufficient she should consult her physician.

Constipation is a frequent cause of ill health in women, and many nurses suffer more or less from this trouble. Very frequently it is due to carelessness or ignorance. If a girl is taught to secure a regular movement of the bowels at a certain time every day she will grow up with regular habits. If she is allowed to neglect this important function, to attend to the bowels sometimes at one hour and sometimes at another, and frequently omit caring for herself an entire day, she will probably be more or less constipated. Every nurse should learn the extreme importance of a regular

daily evacuation of the bowels, and if she has not been taught the proper care of herself while a child she should make every effort to correct this mistake. In case a regular routine is not sufficient she may need a laxative diet and medicines and perhaps injections. A glass of water taken fifteen to twenty minutes before meals is sometimes sufficient as an aid. Frequently fruit is quite a help. Coarse foods, including bran and agar-agar, are often necessary. Sometimes a laxative mineral water or small amount of salts taken in the morning for some time will help toward a cure. Any nurse who has had any trouble with constipation is advised to cure herself before she begins private nursing. The circumstances which surround her in a private house make it very desirable that she should have no trouble of this kind. If she is accustomed to regular habits she will have no special difficulty in caring for herself properly.

The care of the digestive tract suggests the care of the skin. It may be impossible to carry out the habit of daily bathing, *i. e.*, in a tub. Such a habit is very useful to a nurse and should be practised whenever possible. A free use of cold water over the neck and chest is a substitute to be recommended. Perfect cleanliness to prevent all odors of perspiration or exhalation is a matter of course. It is hardly necessary to say that the use of perfumes about the person is vulgar and disagreeable to the patient.

The care of the hands will be spoken of when we come to consider the subject of disinfection in the preparation for labor. It will then appear that clean hands, without cracks, hangnails, or any abrasions, unadorned by rings, are the most important possessions of a nurse.

The care of the skin is closely connected with the subject of clothing. Loose, comfortable clothes should always be worn. They should be warm in winter and afford the proper protection at other seasons of the year. Wool of the proper weight or wool and cotton or wool and silk are the best materials except in the summer. The feet especially should be well protected. The shoes should have reasonably thick soles and be of sensible shape and size with rubber heels. A corset which compresses the waist just below the ribs is

unhygienic and absurd for any woman, but especially for a nurse. Her skirts should be light. She should rely more for the protection of the skin upon the undergarments than upon the skirt. The waist and outside skirts are of course of washable material.

A word should be said concerning the night clothing. Since an obstetrical nurse is almost certainly called upon during the night, when the temperature of the room is lower than in the daytime, she must be prepared with the proper night clothes. Not only should she have a long, warm nightgown with the proper robe, but the feet and lower extremities must be protected. For this purpose pajamas with feet are well adapted. Warm slippers are absolutely necessary. A little extra care or expense will pay for itself many times over if it preserves to the nurse her chief capital, her health.

An obstetrical nurse is often disturbed very much in her sleep, especially during the first week. Unless she is able to get along twenty-four hours without sleep she should not undertake this branch of nursing. The possibility that such a demand will be made upon her at the beginning of her engagement makes it important that she should always go to a case quite fresh and thoroughly rested. In the subsequent weeks she generally will be able to make up her lost sleep.

In order to be in the best possible condition she should take a brisk walk of an hour or half an hour in the open air every day. It may often happen that in the beginning of a case this is impossible, but, as a rule, it can be carried out. The shorter the time that can be devoted to the walk the more wisely should it be employed. Breathing deeply with the shoulders thrown back with an energetic walk of even fifteen minutes will be of value for the entire day.

Duties to Doctor.—In a broad sense of the term the nurse is the doctor's assistant. The doctor alone is responsible to the patient for the management and outcome of a case. It is not possible or desirable to have a divided responsibility. Being responsible it is necessary that the doctor should have complete authority. He is responsible for the nurse and she is responsible to him. From this it follows that it is the duty

of the nurse to work entirely under the doctor's directions. She should assume no responsibility on her own account further than may be necessary to meet emergencies during the absence of the physician. She should under no circumstances institute treatment in opposition to that laid down by him. If it should be necessary to do something not ordered by the physician, she should report to him fully as soon as possible her action and the reasons for it. Only in this way can she secure and retain his confidence and properly perform her duty as his assistant.

It is never her duty to make, unasked, suggestions to the doctor. As a rule only ignorant or superficial nurses think to increase their importance and impress the physician with their knowledge by making suggestions concerning the treatment of the case.

If a nurse should make any mistakes, as anyone may do, she should report these mistakes to the physician at their next meeting. She will find that he will appreciate her situation and think more of her for her frankness and honesty. Nothing is more calculated to shake the confidence of a physician in a nurse than to find out later, from other sources, mistakes which she has not reported.

As the physician's assistant the nurse has to assist or wait on him during his attendance at the confinement, and his subsequent visits and to carry out his orders in his absence. She must also watch her patient and report symptoms. In order to carry out the physician's orders it follows, as a matter of course, that the nurse must understand him. If she has any doubts as to the meaning of any direction she should ask that it be thoroughly explained to her. The excuse that she did not understand what the doctor meant is no excuse at all.

In order to report properly on the progress of a case it is necessary for the nurse to keep a record. The report or record of the nurse is of great importance to the physician, the patient, and to herself. The patient's welfare and sometimes her life depend upon the care with which her symptoms are watched and recorded. A mistake in the temperature or pulse will often deceive the physician and cause him

to overlook an important feature of the patient's condition. Failure of the nurse to observe some unusual temporary symptom may have the same result. Of course a false record is the worst of all. If a nurse should forget to take the temperature or pulse, and in order to cover up her mistake make a record which she thinks is about right, she is guilty of a crime against the patient which, at times, might have the most serious consequences.

The nurse's record is of great importance to the physician, for it enables him to see in a moment the events of the day. If a nurse could know what satisfaction a physician takes in a properly kept record, complete yet not diffuse, neat and easily read, she would feel herself repaid for a little extra care.

For the nurse herself the record is of importance because by it her education, ability, and character are often judged. Poor spelling and poor writing stamp a nurse as ignorant and careless. A diffuse, mixed-up report shows her to be illogical and poorly trained. A neatly written report that contains only essential matters marks her as one possessed of good mental qualities and proper training.

It is always desirable that she should form the habit of recording each item as soon as observed. Unless this habit of making a prompt record is formed she will become accustomed to delaying writing for several hours, when some things will be forgotten and the record will lose its accuracy. If possible the records should be kept in ink, being thus permanent and neater.

Of course the record should be preserved until the case is terminated. It is often necessary to refer back to it for the history of the beginning of the case. When the nurse leaves to whom does the record belong? If the physician does not care for it the nurse may preserve it if she chooses. It is not good policy, however, for her to preserve a number of records in one book. When she carries such a case-book from one patient to another she exposes the history of a former case to the eyes of strangers. The nurse cannot know but what the patient or the patient's friends or the physician may take up her case-book to look at the record of

the patient and almost involuntarily notice reports of former cases. A great majority of patients would object to this publication of the history of their sickness; therefore, if a nurse preserves her reports she should keep each case separately.

Sometimes a physician furnishes the blanks for the records, as he wishes to preserve them for future reference. The accompanying charts show a form which will perhaps serve as a model for childbed and infant records. They are kept on cards 10 x 15 centimeters in size, to file away with pregnancy and labor cards.

BABY RECORD.

Name.			When born.			Birth weight.	Page
Hour.	P.	T.	Bowels.	Urine.	Navel.	Eyes.	

PUERPERAL RECORD.

Name of patient.			Date of confinement.			Name of nurse.		Page
Hour.	P.	T.	Bowels.	Urine.	Lochia.	Breasts.	Medicine.	

In a system like this as much space can be used as is needed. One or two pages or more may be used in a day or one page may serve as a record for two or three days. A heavy line drawn across the card separates the report of one day from another. The date is placed in heavy figures in the hour

column. The ordinary method of indicating the time in the hour column for each separate entry is, of course, known to all. Any necessary remark concerning the bowel movement is placed in the proper column. The quantity of urine as well as its character is to be recorded if possible. During the first two or three days the amount and character of the lochia is reported in some detail. Later a general observation of the entire day may suffice. The condition of the breasts should also be noted with some detail. In the last column the facts concerning sleep, food, and bathing can be entered. General observations that might be assumed may be omitted. For example, patient washed, patient rubbed, or dressing changed are unnecessary items. More explanations for the use of the puerperal and baby records will be given in subsequent chapters.

It is often necessary to advise a young nurse upon leaving the hospital to engage in private nursing that she should be loyal to the doctor in charge of the case. She finds that his practice differs, perhaps in important details, from that which she has been taught in her training course. She should never comment on this fact to the patient or to the patient's friends and compare a physician in attendance with some other physician with whom she has been associated. Such a course is very unwise and will generally react against her. If she, by this course, should create a lack of confidence in the physician on the part of the patient she may be doing a great deal of harm to both parties. She should carry out directions which seem to her useless. It is not her business to judge. Loyalty to her physician should be her constant motto. If a case should ever rise where she is unjustly accused by the physician, she would better suffer quietly than to bring the matter before the patient. In extreme cases where she feels that great injustice has been done her, she would better ask the advice of the superintendent of her training-school.

Duties to Patient.—As assistant to the doctor it is the duty of the nurse to her patient to carry out his orders. This subject has been sufficiently discussed. There are, however, duties devolved upon the nurse which are not directly com-

prised in the explicit directions given by the physician. These assumed duties may be comprehended in the statement that a nurse should secure for her patient the best possible physical and mental condition. Both are promoted by the proper and skilful care of the patient's toilet, care of her room and surroundings, and the general conduct of the case so as to prevent worry, anxiety, or annoyance.

In brushing the hair, giving a sponge bath, a douche, or an enema a nurse displays not only her training but also her habits of attentive tidiness. It is impossible to give explicit directions to a nurse who is careless in these respects. Tidiness and cleanness should be part of a nurse's nature. A nurse who makes such mistakes after a hospital training of three years is hopeless. A first-class nurse will attend to the personal wants properly because she herself knows what good breeding desires and demands. Knowing what she herself desires she will have no difficulty in satisfying any patient.

The same golden rule that applies to the toilet applies also to the room and the surroundings. A refined nurse will imagine herself the patient and picture her satisfaction with a tidy and well-ventilated room. She would appreciate the nurse who knows how to dust the room, not by brushing into the air a cloud of dust to settle back on the furniture or floor. The sensitive patient regards these things often much more than a knowledge of anatomy or medicines.

A nurse cares for the mental condition of her patient by what she does and by what she does not do. A cheerful and quiet manner is appreciated by everyone. Some ability to entertain is not to be despised. A gossipy nurse is, however, somewhat dangerous. Above all things a nurse must avoid speaking of other patients or of the affairs of families in which she has lived. Whatever she learns of a patient or a patient's family should be held strictly confidential. Should a patient be so indiscreet as to ask about such matters the nurse is in duty bound to avoid giving answers to such questions.

A nurse should also avoid the introduction of disagreeable subjects. Conversation about diseases in general is undesir-

able. A nurse will soon learn the temperament of her patient and subjects that should be introduced.

A nurse should not ask unnecessary questions. Whatever pertains to her work let her find out for herself or from servants or other members of the family if possible. In an obstetrical case it is always well for a nurse to go to the house before the time of the expected confinement to learn the arrangements of the house in order that she may not need to annoy the patient after the labor begins.

A nurse should also leave her patient alone at times. Often a patient wishes rest of which she is deprived by the presence and perhaps the conversation of the nurse. Let the nurse occasionally withdraw from the room, remaining within call.

It is a nurse's duty to protect her patient from visitors and also from members of her own family. In the performance of this duty considerable tact and skill must be employed. A nurse who would brusquely order from the room a husband, a mother, or a sister of the patient may be very conscientious, but would never be a favorite. Rules must vary according to the case. In general, visitors are kept out of the sick-room for the first week or two and perhaps longer by the doctor's directions. If the members of the family tire or annoy the patient, they also must be excluded. This can always be done, however, in a quiet way that will give no offence.

One of the chief causes of anxiety to the mother is the baby, and the nurse by proper management of the baby can do more to make the mother easy and happy than in almost any other way. The idea has become quite widespread that it is the duty of the nurse to begin the training of the baby at its birth. Following out this idea she concludes that the baby should lie in its bed two or three hours at a time, when it is to be fed and replaced. If the baby cries it is because it is bad and needs strict training. Mothers do not fully appreciate the importance of this early training and often worry considerably over the crying of the baby. This training of a new-born infant is overdone. If a baby cries it is because it has pain. If a baby is comfortable,

warm, clean, and properly fed it will sleep quietly most of the time. Walking with the baby is generally undesirable. It is the duty of the nurse to find out if possible the cause of the baby's discomfort and relieve it. If she cannot discover the trouble she must, of course, get the assistance of the physician. If both the nurse and the physician fail the nurse must make the best of a bad situation and keep the child as quiet as she can. Under no circumstances should she distress the mother by complaining of the child and call it naughty or ugly. A week-old infant is never naughty. It is uncomfortable or sick, not because of any fault of its own but because of lack of adaptation to its surroundings. A sympathetic nurse who says this to the mother will do her duty much better than one who is constantly grumbling about the baby or coldly trying to train it.

Another duty of a nurse to her patient is to serve as an example. Through the example of the nurse the patient learns the essential ideas of cleanliness. She learns how to wash herself and how to care for the breasts. If the breast shield must be used she learns from the nurse how to clean the shield and the nipple. If artificial feeding is necessary the patient learns how to prepare the food and how to care for the nursing bottle. The nurse should always wash the baby in the proper way in order that the patient may learn only the best methods. As an example and as a teacher the nurse has a field of great usefulness. Her teaching function is by no means one of the least of her duties.

Engagements and Arrangements for an Obstetrical Case.—

An obstetrical engagement is generally made some time before the expected confinement. On account of the difficulty of determining in advance the exact day of the confinement it is necessary that the nurse should have some kind of an understanding with the patient concerning the date of beginning and the terms of the engagement. While wealthy patients frequently make an engagement with a nurse to begin a few days before the expected confinement at a full salary, a great majority of patients dislike to pay a nurse before her work begins. It is, however, not just for the nurse to wait several days or perhaps two or three weeks

losing her time. A very reasonable compromise is that the nurse should receive half-pay or part-pay while waiting after a specified date, to be determined by the physician. During this time she may remain at her home or at the patient's home, as would be agreed upon. This plan is especially recommended to nurses during the first two or three years of their private work. Later their own business ideas will be a sufficient guide.

A nurse should not make any engagements that possibly overlap. If, for example, she be engaged for a case for four weeks beginning February 1 she should not take a case beginning March 1 unless with a distinct understanding with both parties. She should always allow one week for the postponement of the first confinement.

A nurse should always be prepared to go to a case without a moment's delay. Her satchel and clothes should always be in readiness. She should never go to a case of contagious disease for two or three weeks before an expected obstetrical case. She ought to arrange for permission to leave on a moment's notice any case she is attending a fortnight before a confinement case is expected.

CHAPTER II.

ANATOMY, PHYSIOLOGY AND EMBRYOLOGY.

CERTAIN elementary facts concerning the anatomical structure and functions of the pelvis and genital organs of woman are necessary to an intelligent study of pregnancy and labor. A short description of the chief stages in the development of the fetus is also desirable to furnish an intelligent idea of the growth of the child from the egg, its relations to the mother, and the meaning and importance of the fetal appendages during pregnancy. The most essential facts in elementary form will be given in this chapter.

Pelvis.—The bony pelvis is the lower part of the trunk skeleton. It is an irregularly shaped, somewhat curved, hollow cylinder, formed of four bones: the two hip bones, the sacrum, and the coccyx. The sacrum is formed by the uniting together of the five vertebræ below the lumbar vertebræ or those of the small of the back. The rudimentary last four vertebræ of the spinal column form the coccyx. Each hip bone, also called innominate bone or os innominatum, is formed by three bones: the ilium behind and above, the ischium below, and the pubic bone in front, which merge early in life into one bone. The junction of the pubic bones in front is called the symphysis pubis (Fig. 1, Frontispiece). The sacrum and coccyx behind with the lower main parts of the hip bones at the sides are bound together by strong ligaments and form the walls of the small or true pelvis. The upper wings of the hip bones at the sides and the lumbar vertebræ behind form the so-called large pelvis, which partly encloses the lower segment of the abdominal cavity. The true pelvis encloses the pelvic cavity, which contains, besides the muscles and fasciæ that line its walls, also the organs of generation as well as the bladder and rectum (Fig. 2). The

soft pelvis is the name applied to the skeletal pelvis lined with muscles and other soft parts to distinguish it from the hard or bony pelvis. It is the obstetrical canal through which the child must pass in its birth.

The opening into the pelvic cavity from above is called the inlet or brim of the pelvis. This plane is somewhat

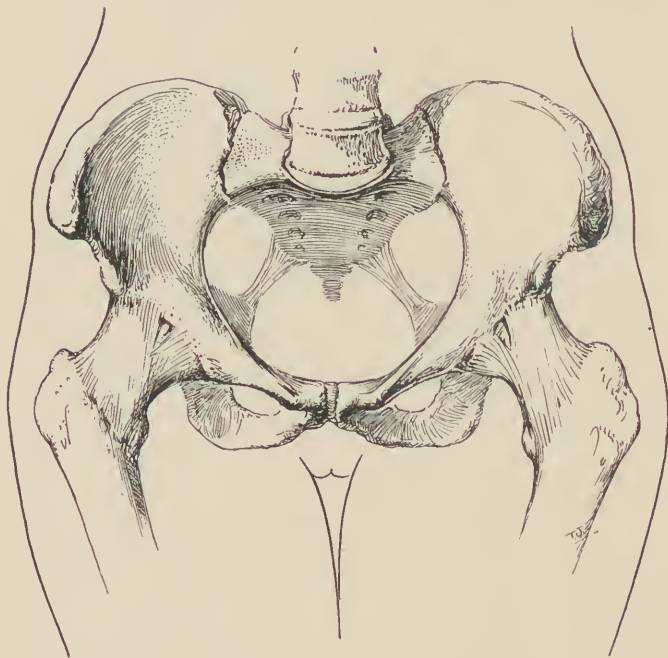


FIG. 2.—Female pelvis, with thigh bones articulated, showing also the sacrospinous ligaments which help to close the pelvis below.

heart-shaped, the indentation from behind being formed by the upper part of the sacrum, which is called the promontory of the sacrum. The exit from the pelvic cavity, or the bony obstetrical canal, is called the outlet. We shall learn during the study of labor that the pelvic outlet is not the same as the true obstetrical exit, namely, the vaginal

outlet. The space between the inlet and the outlet is the cavity or excavation of the pelvis.

The size of the pelvis of a woman is very important, for if it is smaller than the child at birth, natural labor is impossible. A pelvis which is too small to admit of the passage into and through it of a child of normal size is called a contracted pelvis. It may be contracted in any part of the canal, but it is most frequently contracted at the inlet. When it is contracted from before back, *i. e.*, when the

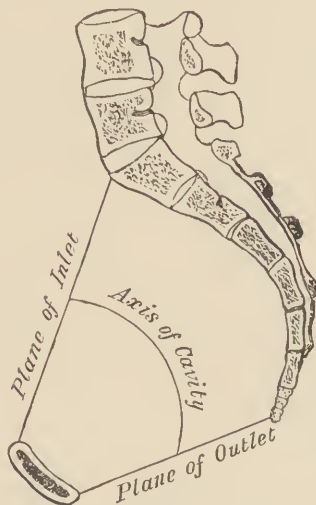


FIG. 3.—Median sagittal section of pelvis. (Gray.)

antero-posterior diameter of the inlet is shortened, the pelvis is called a flattened pelvis. When the inlet is equally contracted in all directions, *i. e.*, when all the diameters are shortened, the pelvis is called a generally contracted pelvis. A funnel pelvis is one in which the inlet is normal in size or larger than normal, while the outlet is contracted. There are many other forms of contracted or deformed pelvises, such as the obliquely contracted or Naegele pelvis and the many varieties of irregularly contracted pelvises. A pelvis

may be contracted irregularly at the brim, at the outlet, or in the excavation (Fig. 4).

It is interesting to know the differences between the pelvis of the child, the woman and the man. In a child the pelvis is comparatively small, narrow, and straight. In a girl at the age of puberty, that is about twelve or thirteen years, it becomes larger, more curved, and assumes the adult form. The male pelvis is longer and narrower.



FIG. 4.—Three types of contracted pelvises: *A*, irregularly contracted (beak) pelvis; *B*, flattened rachitic pelvis; *C*, funnel pelvis; *D*, funnel pelvis, sagittal section.

Most of the deformities of the pelvis begin in the young child when the bones are soft or forming, and are due to rickets, a disease which disturbs the growth of the bone. Figures representing a sagittal section through a normal child's pelvis and a similar section through a rachitic pelvis show how the pelvic bones are deformed as a result of rickets. It is important to know that this preventable children's disease, which is due largely to disturbed nutrition, is the cause of a large number of difficult labors.

EXTERNAL GENITALS.

The genital organs in the woman consist of the internal organs contained within the pelvic cavity and the external organs which form the vulva. The external genitals include the mons veneris, labia majora and minora, the clitoris, the vestibule, the hymen, and the vulvo-vaginal glands. These, together with the exterior orifices of the urethra and the perineum, require a short description.

Mons Veneris.—The mons Veneris or mons pubis is the region over and above the symphysis pubis, *i. e.*, the junction of the anterior portions of the hip bones. The skin is elevated with a fatty deposit and covered with hair.

Labia Majora.—The labia majora, or large lips of the vulva, are broad, elliptical folds of skin containing elastic, vascular, and fatty tissues, which pass backward from the mons Veneris, uniting behind in the fourchette, the anterior fold of the perineum, to enclose the vaginal outlet. They are more or less covered with hair. The lips lie normally in apposition and enclose the other genitals.

Labia Minora.—The labia minora, or small vulvar lips, also called the nymphæ, are the folds of very delicate skin which lie inside the labia majora. Starting from the sides of the latter they converge to the front, where each fold divides into two, the lower from each side uniting under the clitoris, and the upper uniting above to form its prepuce. The inner surfaces of the labia minora are in contact. Unless elongated they are not seen until the labia majora are separated.

Clitoris.—The clitoris is the small sensitive body which lies in the middle line and is protected by the upper folds of the nymphæ which form its prepuce, as just described. The end of the clitoris body is the glans of the clitoris. It is generally free from the prepuce, but covered by it.

Vestibule.—The vestibule is the sensitive triangular space lying back of the clitoris, bounded by the labia minora on the sides and the anterior border of the vaginal orifice behind. Nearly in its center is seen the opening of the urethra, the canal which leads from the bladder.

Hymen.—The hymen is a fold of vaginal mucous membrane, frequently crescentic in shape, arising from the posterior border of the vaginal outlet, partly closing it. It is

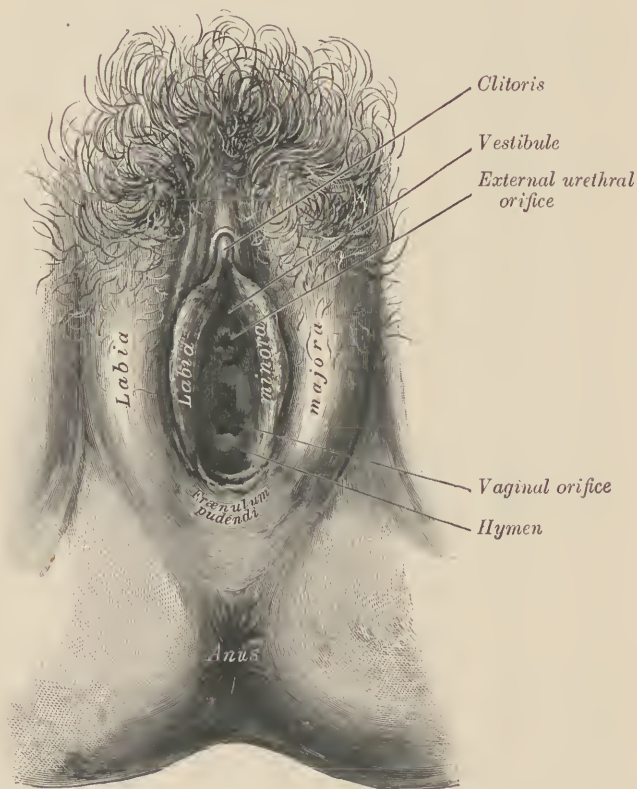


FIG. 5.—External genital organs of female. The labia minora have been drawn apart. (Gray.)

generally torn after marriage, and if not, always after childbirth. The torn edges form an irregular border to the vaginal outlet, and these irregularities are called the *carunculæ myrtiformes*.

Vulvo-vaginal Glands.—The vulvo-vaginal or Bartholin glands lie one on each side at the sides of the vagina behind the labia majora and empty by relatively long ducts about at the junction of the middle and posterior third of the vaginal opening just inside the nymphæ. They are important in obstetrics, for they are often the seat of a chronic gonorrheal infection, which may be the source of a contamination of the child's eyes at birth.

Perineum.—The perineum is the name given to the body of muscle and fascia lying between the vaginal mouth and the anus. It is about two inches long from before back, and extends outward on each side toward the diverging anterior branches of the hip bones. The perineum is of some importance to the support of the vagina. When it is torn, as often happens in labor, the proper closing of the vaginal outlet is interfered with, and gaping of the vagina results.

INTERNAL GENITALS.

The internal genital organs lie partly or wholly in the pelvic cavity, and consists of the vagina, uterus, Fallopian tubes, and ovaries (Fig. 6).

Vagina.—The vagina is a muscular fibrous tube lined with mucous membrane, which is the entrance canal to the uterus and the exit for the fruit as well as for other uterine discharges. It lies in the pelvis between the urethra and bladder in front and the rectum behind. The uterus projects into it and carries down the upper portion of the tube, which thus forms a kind of collar around this projecting vaginal portion of the uterus. The upper portion of the vagina which is reflected from the cervix and forms the upper dome-like end is called the fornix of the vagina. This part as well as the middle portion or body of the vagina is much larger and more distensible than the lower end or mouth. Hence during the passage of the child the lower end is much more frequently torn. The muscular and fibrous tissues which surround, close, and support the vagina are attached directly or indirectly to the walls of the bony pelvis, and with similar structures of the rectum form the pelvic floor. This is a very

important structure, for it helps to support the genital organs. It is also often torn or injured during labor, when more or less displacement of the genital organs results.

Uterus.—The uterus or womb is a pear-shaped, hollow, muscular organ, lined on the inside with mucous membrane,



FIG. 6.—Internal genital organs, with bladder, urethra, and rectum all distended, seen from the side.

covered in part on the outside with peritoneum, the serous membrane that lines the whole abdominal cavity. The uterus is divided into two parts, the cervix or neck, and the corpus or body. That portion of the neck of the uterus that projects into the vagina is called the vaginal portion. Into the upper part of the body on the sides are inserted the

Fallopian tubes and also the round ligaments. The base of the uterus or that portion beyond the insertion of the tubes and ligaments is called the fundus. The uterus varies in size, being generally somewhat larger after a woman has

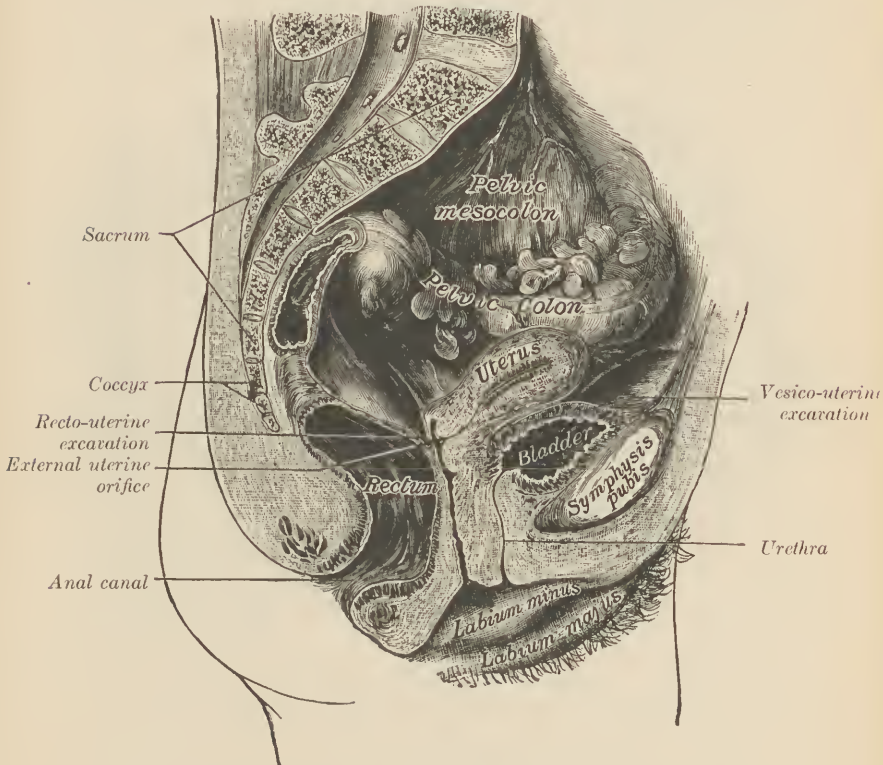


FIG. 7.—Median sagittal section of female pelvis. (Gray.)

born children. In the virgin it is two and three-fourths to three inches long, about one and one-fourth inches belonging to the neck. The hollow interior of the uterus is likewise divided into two parts: the cavity of the body and the cervical canal. The cavity of the body is triangular, the upper

angles of this triangle corresponding to the openings of the Fallopian tubes, and the lower angle or apex corresponding to the beginning of the cervical canal. This opening, which of course is at the junction of the neck and body, is called the internal os. The opening of the cervical canal into the vagina is called the external mouth or os.

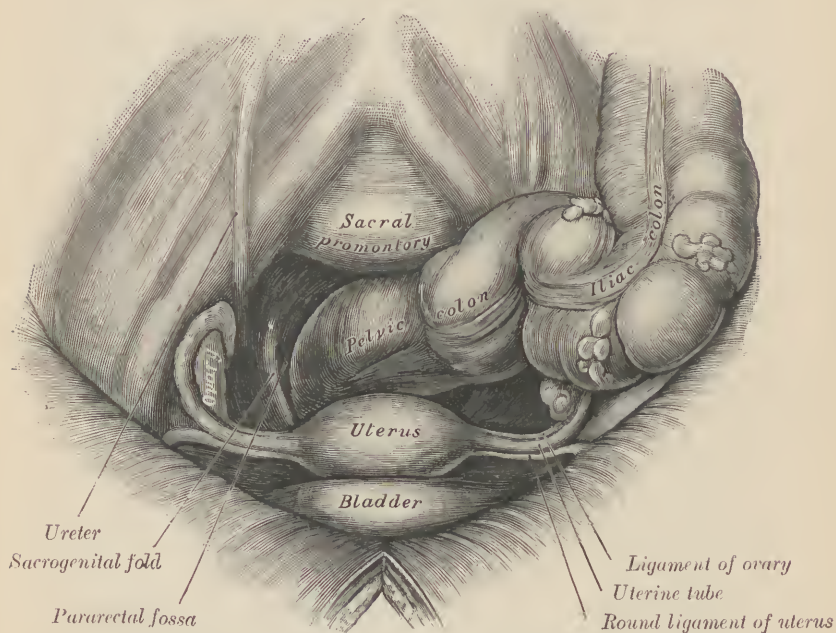


FIG. 8.—Female pelvis and its contents, seen from above and in front.
(Gray.)

When a woman is standing the normal position of the uterus is nearly horizontal, the cervix pointing backward toward the hollow of the sacrum, while the base of the uterus lies just below the inlet to the pelvis, pointing forward. The uterus, which is slightly concave on its anterior or lower surface, lies upon the bladder, while the bowels rest upon its upper or posterior surface. It is supported at the sides

by the broad ligaments that attach it to the walls of the pelvis. These are folds of peritoneum which enclose the same muscular and elastic tissues and the vessels that pass to the uterus. They, however, allow considerable motion to the uterus so that it straightens and rotates backward as the bladder fills, and forward again as it empties. Normally it should rise easily into the abdomen as it enlarges.

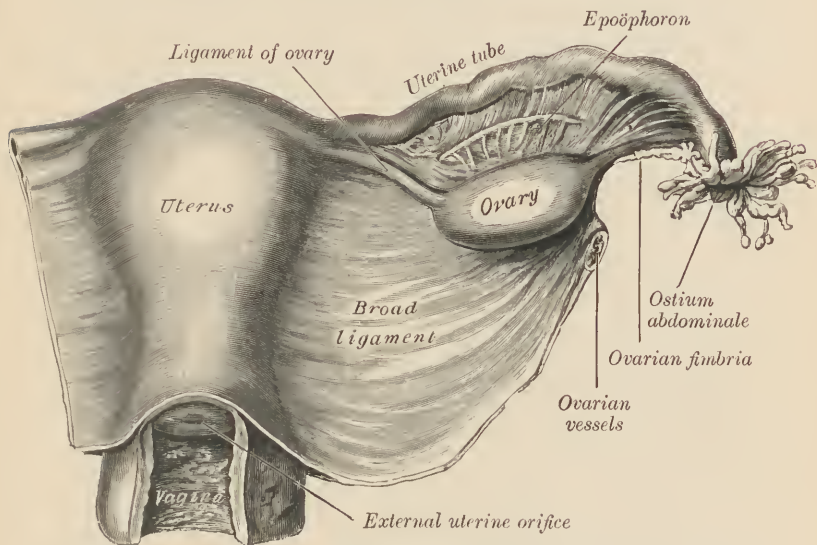


FIG. 9.—Uterus and right broad ligament, seen from behind. The broad ligament has been spread out and the ovary drawn downward. (Gray.)

Ligaments of the Uterus.—The round ligaments arise from the fundus in front of the uterine insertion of the tubes and pass under the peritoneum outward and forward in a curved line to the inguinal canals, through which they pass to be inserted into the abdominal walls (Fig. 8). When they functionate properly they help to hold the uterus in contact with the bladder and prevent too great a backward displacement of the uterus when the bladder is distended. The utero-sacral or posterior ligaments of the uterus are folds of

peritoneum containing some fibrous and muscular tissue, which arise from the sides of the posterior wall of the uterus

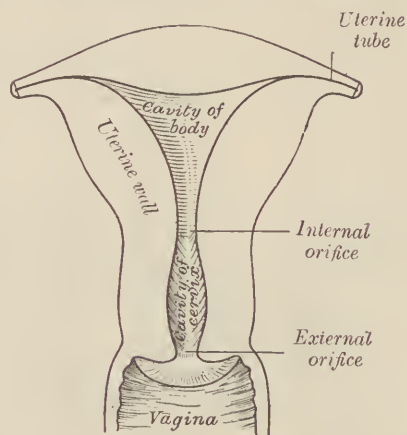


FIG. 10.—Posterior half of uterus and upper part of vagina. (Gray.)



FIG. 11.—Retroversion of the uterus, with coils of intestines between bladder and uterus.

at the junction of the cervix and body, pass around the rectum, and are attached to the body of the second sacral vertebra. They hold the lower part of the body of the uterus backward while the round ligaments hold the fundus forward. They thus help to keep the uterus in its normal condition in contact with the bladder. If they are weakened or elongated, and if at the same time the round ligaments are similarly injured, the uterus may change its position so that the fundus falls back into the hollow of the sacrum.



FIG. 12.—Retroflexion of the uterus.

Coils of intestine get between the bladder and uterus, which becomes retroverted (Fig. 11). If the junction of the cervix or body is thin or soft the uterus may bend backward and we have a retroflexion (Fig. 12). When these displacements occur during pregnancy they may cause troublesome or serious disturbances.

Functions of the Uterus.—The functions of the womb are to receive a newly fertilized egg, nourish the developing child from its earliest beginning until it is able to live inde-

pendently, and then expel it. To fulfil these varied functions it must be liberally supplied with blood, and be lined with a membrane specially adapted to receive and support the egg. It must also be muscular to expel the ripened egg. This muscle is an involuntary muscle, *i. e.*, it is not under the control of the will. In this respect it is similar to the muscle of the intestine or the heart, which organs must also work quite independently of the will.

Menstruation.—In this connection one other function of the uterus may be mentioned here, namely, menstruation. This is a bloody discharge from the uterus, occurring every twenty-eight days, that lasts from two to six days. Sometimes it occurs as often as every three weeks and also as rarely as every six weeks. Greater variations are abnormal. When the flow lasts more than six or seven days or less than two days and when it is excessive in amount it is pathological. Normally there may be a feeling of fulness in the pelvis and a slight general malaise. Backache, cramps, headache, etc., are symptoms of abnormal condition and constitute a dysmenorrhea. The discharge consists of blood cells which pass out of the bloodvessels through the walls, or perhaps sometimes from ruptured vessels, and cast off cells from the lining membrane of the uterus, mixed with a serous fluid and mucus. The beginning of menstruation is coincident with the changes in a girl which makes her a woman. Among these changes are the development of the breasts, the growth and change in the shape of the pelvis, the growth of the uterus, etc. This period in a girl's life we call puberty. It generally commences at about the age of twelve to fifteen years. Menstruation generally stops at the age of forty-five to fifty years, when certain retrograde changes occur in the genital organs. This period we call menopause or climacteric, or popularly the change of life.

Various theories have been advanced to account for menstruation: one is that it prepares the uterus to receive the egg, another is that it results because impregnation has not occurred. In favor of the latter theory it may be said that a girl may become pregnant before she has menstruated, and many women become pregnant while nursing before men-

struation has reappeared. It is quite possible that a woman may be carrying or nursing a child during all of the child-bearing period and never menstruate at all. Menstruation is dependent upon ovulation and the changes which occur in the ovary after the rupture of the follicle and escape of the ovum, *i. e.*, in the formation of the corpus luteum. The menstrual discharge, or periodical escape of blood from the uterus, is not the only phenomenon resulting from the menstrual changes of the uterus. There is really a cycle of changes in the uterus, all probably dependent upon the same cause and all important. For a few days before the escape of blood the uterus is congested, its mucous membrane thickened, there is frequently some fulness of the breast and other symptoms. This first stage is the premenstrual stage. Then comes the second stage or menstruation proper. Then follows a stage of regeneration of the mucous membrane of about five days. Finally there is a period of rest lasting eight to ten days.

All of these menstrual changes are of much importance not only because of their effect on the life and health of the woman, but also because of their obstetrical relations. Abnormal conditions may be the cause of sterility or of abortion or of diseased condition during pregnancy.

Fallopian Tubes.—The Fallopian tubes are the canals for the passage of the egg from the ovaries to the uterus. The sperm cells also pass from the vagina through the uterus into the tubes, where they meet the egg and fertilize it. The tubes are therefore normally only canals, but sometimes an egg lodges in a tube and grows there. These cases are called tubal or extra-uterine pregnancies. The tube is not adapted to the function of nourishing the egg, however, and generally ruptures in a few weeks, producing one of the most dangerous conditions. In structure the tube is a muscular wall lined with mucous membrane. It is about four inches long and lies in the top of the fold of peritoneum, which helps to form the broad ligaments of the uterus. Each tube opens into the uterus on the corresponding side near the base by a small mouth. Its outer end is trumpet-shaped and opens into the peritoneal cavity. It is movable and has been supposed to grasp the ovary when an egg breaks free.

Ovaries.—The ovaries are small bodies, two in number, supported by ligaments at the sides of the uterus near the walls of the pelvis. They have a fibro-vascular tissue and contain the unfertilized ova or eggs. The ova are very numerous and irregularly scattered through the ovaries, each ovum being surrounded by small cells. In a young girl all of the ova are quite small, but during the child-bearing period some of them grow and develop from time to time into ripe or mature eggs. As a rule one egg ripens each month and breaks away from the ovary. As the ovum develops

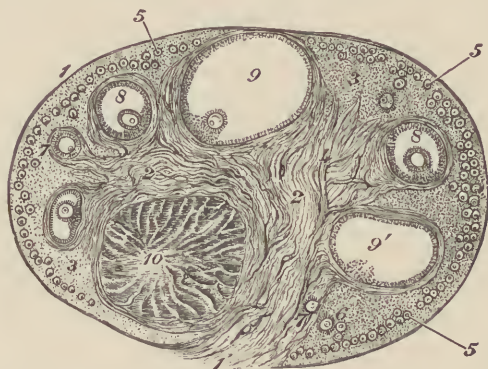


FIG. 13.—Section of the ovary. (After Schrön.) 1. Outer covering. 1'. Attached border. 2. Central stroma. 3. Peripheral stroma. 4. Blood-vessels. 5. Vesicular follicles in their earliest stage. 6, 7, 8. More advanced follicles. 9. An almost mature follicle. 9'. Follicle from which the ovum has escaped. 10. Corpus luteum.

it not only grows in size itself, but the surrounding cells increase in number and form a cavity which becomes partly filled with fluid. During this change the ovum cavity, or Graafian follicle as it is called, moves from the interior of the ovary toward the surface, where it protrudes, and at last bursts, allowing the escape of the ovum. This process is called ovulation.

Corpus Luteum.—The emptied Graafian follicle develops into a very interesting organ, the corpus luteum. There is a great proliferation of the cells which line the follicle,

and these penetrate into the blood clot which fills its interior. These cells are called the luteum cells because of their yellow color. The yellow body takes on the structure and functions of a ductless gland. A secretion is formed which, acting on the uterus, causes its mucous membrane to become congested and prepared to receive a fertilized egg. If fertilization does not occur menstruation takes place and then the "corpus luteum of menstruation" degenerates and partly disappears. If fertilization and nidation occur, the corpus luteum grows larger, and continues to functionate during pregnancy to gradually disappear after labor.

URINARY ORGANS OF WOMAN.

Before taking up the fertilization and development of the egg we must consider for a moment the non-genital pelvic organs that may have obstetrical relations with the genitalia. Also we must study the breasts, which are very important organs in the reproductive system.

The urinary organs consist of the kidneys, the ureters, the bladder, and the urethra. The kidneys are excretory organs whose function is increased during pregnancy. They lie high up in the back above the false pelvis on each side of the spinal column and behind the peritoneum. Unless displaced they come in spatial relation with the uterus only in the latter part of pregnancy.

Ureters.—The ureters are tubes that convey the urine from the kidneys to the bladder, into which they open on its under surface. They lie under the peritoneum, and in their course bend over the bones that form the posterior wall of the pelvis at its brim. Here they are liable to compression by the heavy, gravid uterus, and there may occur a dilatation of the upper portion of the tube, with consequent disturbance of the kidney secretion.

Bladder.—The urinary bladder is a hollow muscular organ that acts as the reservoir of the urine, which it receives continually from the kidneys and evacuates from time to time. It is lined with mucous membrane and partly covered with peritoneum. It lies in the pelvis between the symphysis

pubis in front and the uterus and vagina behind. It is held in position by ligaments which allow a considerable amount of movement. When it is empty it lies entirely in the pelvis, and its upper surface is flat and in contact with the under surface of the uterus. When distended the upper surface becomes rounded, and it rises out of the pelvis and the uterus

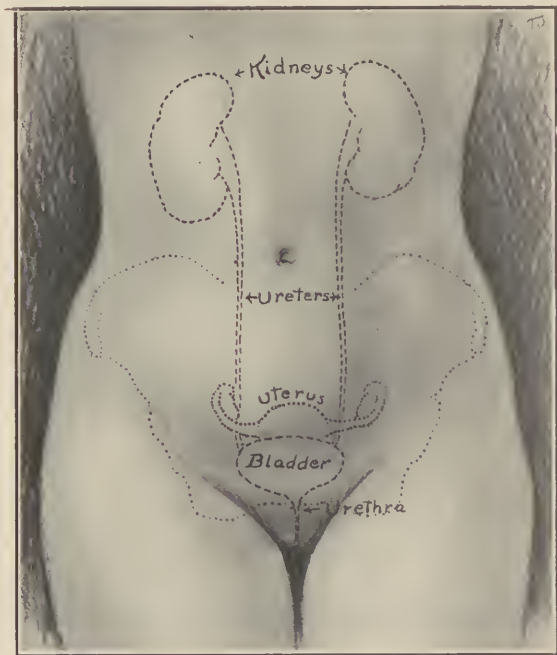


FIG. 14.—Diagram showing relation of the urinary organs to the genital organs and the pelvis.

is pushed back. The bladder may be injured during labor and disturbances are apt to occur during pregnancy and the puerperium.

Urethra.—The outlet of the bladder, the urethra, is, in the female, a short tube less than two inches long, that passes backward from its opening or meatus in the vestibule

to the lowest point of the bladder. It is closely connected with the anterior wall of the vagina, which it pushes out in a kind of rounded ridge.

INTESTINES.

Some loops of the small intestine lie in the upper part of the pelvic cavity, resting upon the upper part of the uterus and bladder. These are pushed up out of the pelvis as the uterus enlarges in pregnancy. When the uterus is displaced backward, coils of intestines lie between the uterus and bladder. (See page 43.)

The lower portion of the colon and the rectum lie in the pelvis behind the uterus and vagina and in front of the sacrum and coccyx. The rectum may be divided into two parts, the upper or pelvic portion and the lower or perineal portion. The pelvic portion is a continuation of the sigmoid colon and begins at the second or third sacral vertebræ and ends at the outlet of the bony pelvis. Here the muscle which forms the pelvic floor surrounds the bowel and begins to be inserted into the lower or perineal rectum. The pelvic rectum is called the ampulla, and is the fecal receptacle. When empty it corresponds to the curve of the sacrum, being concave forward. When filled with feces it is cylindrical or spheroid and may displace the uterus, vagina, and bladder.

The lower or perineal rectum is bent backward, forming with the upper portion an S. It is surrounded by a strong circular muscle, the sphincter, and except during defecation is empty. Its opening at its insertion into the skin is called the anus. It is quite vascular, and its veins frequently become greatly distended during pregnancy or labor and form piles or hemorrhoids.

PERITONEUM.

The peritoneum is a serous membrane that lines the abdominal and pelvic cavities, covering the walls and being reflected over the organs. The pelvic peritoneum may be pictured as a membrane that lines the soft pelvis pushed

inward by the rectum from behind and the bladder from the front. Then the uterus and its adnexa push up a fold which stretches across from one side of the pelvis to the other. Between the layers of peritoneum which form these folds are the vessels that supply the uterus and tubes. These folds are the so-called broad ligaments. Another pair of folds of the pelvic peritoneum pass from the sides of the second sacral vertebra around the rectum to the junction of the cervix and body of the uterus and form the utero-sacral ligaments of the uterus.

BREASTS.

The breasts or mammary glands (see page 51) are situated on the anterior wall of the chest, but are to be considered as a part of the reproductive system. Each breast is composed of fifteen to twenty lobes, each lobe having a duct that empties in the nipple. Shortly before entering the nipple it is dilated into an ampulla or a sinus lactiferous, that is, a small reservoir for the breast secretion. Following the duct into the lobe we find that it divides into many branches, each of which goes between the subdivisions of the lobe called lobules. Further branches of the interlobular ducts enter the lobules, subdivide and finally end in dilations called acini. These are lined with the secreting cells and surrounded with a network of blood and lymphatic vessels and abundantly supplied with veins.

The breasts are but slightly developed in the fetus. Some growth occurs shortly after birth and then the glands remain quiescent until puberty, when a considerable development occurs.

During pregnancy the glands take on further growth and function, and finally after labor they are ready for their function, lactation.

The size and shape of the breast differ much in different individuals and also in the same person at different times of life. In general we may say that they are conical or hemispherical, resting on the front of the chest. At the most prominent point is the nipple, surrounded by a pigmented

area called the areola. In the areola are a number of sebaceous glands which increase in size during pregnancy, and are then called Montgomery's glands.

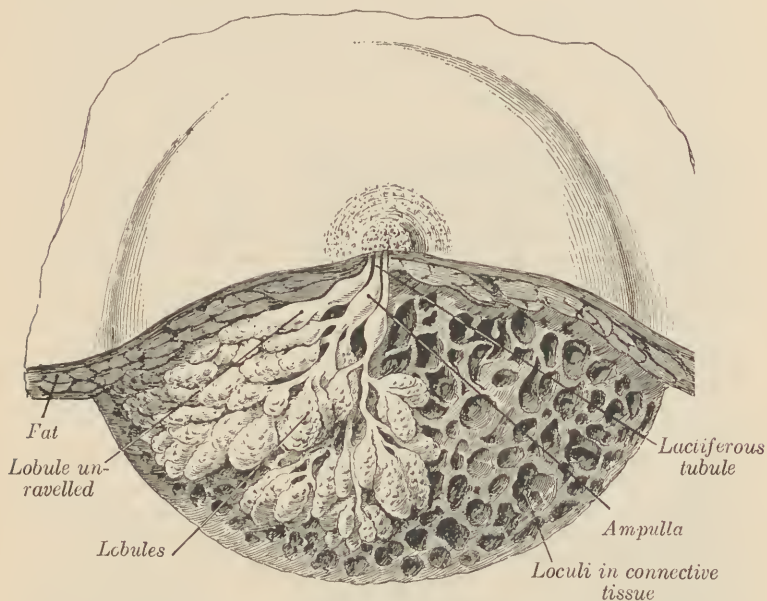


FIG. 15.—Dissection of the lower half of the mamma during the period of lactation. (Luschka.)

EMBRYOLOGY.

Development of the Egg.—Ovum.—The egg or ovum is a cell like all other elements of the body. But unlike all other cells it has the wonderful power to unite with a similar cell from another individual and then develop into an independent body. Like other cells the ovum consists of a mass of cytoplasm and a nucleus. The nucleus, although much smaller than the cytoplasm, is the most important part of the cell, for it is the chief agent in the division of the cell, and it contains the fundamentals of the characteristics of the parent

which make the child resemble the mother. The ovum has also a membrane surrounding it.

Spermatozoön.—The sperm cell, or spermatozoön, looks very different from the ovum, as will be seen by the figure. It consists almost entirely of nucleus. It has the power of independent motion, a power that is necessary to enable it to come in contact with the ovum. Sperm cells are very numerous in the semen, and a large number find their way



FIG. 16.—Ovum in Graafian follicle.

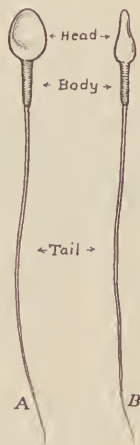


FIG. 17.— Spermatozoa: A, front view; B, profile view.

into the tubes, where they meet the ovum. Only one sperm cell penetrates into the egg.

Fertilization.—The first step in the development of the new being is fertilization or impregnation, *i. e.*, the fusion of the sperm cell with the nucleus of the unfertilized ovum. After the sperm cell has penetrated the membrane of the ovum it moves toward the nucleus until it meets it and merges with it to form the nucleus of the now fertilized egg (Fig. 18).

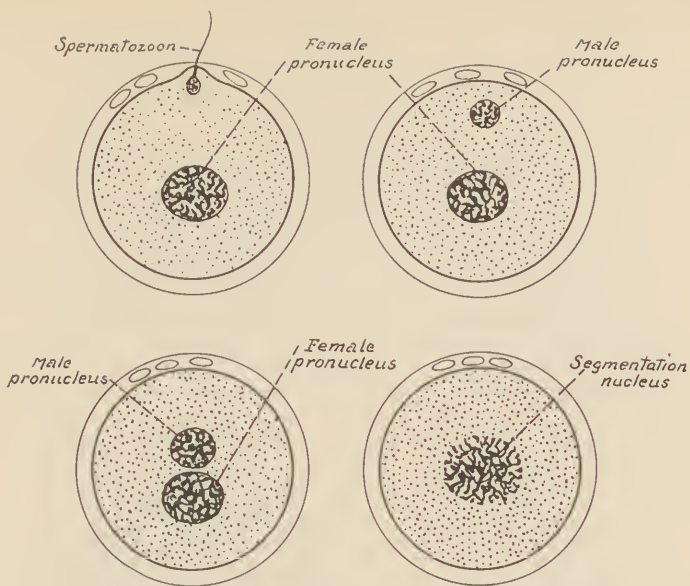


FIG. 18.—Fertilization, four steps. The first shows the penetration by the spermatozoon, the second the formation of the male pronucleus from the head and body of the spermatozoon, the third the approach of the pronuclei, the fourth the merging of the pronuclei.

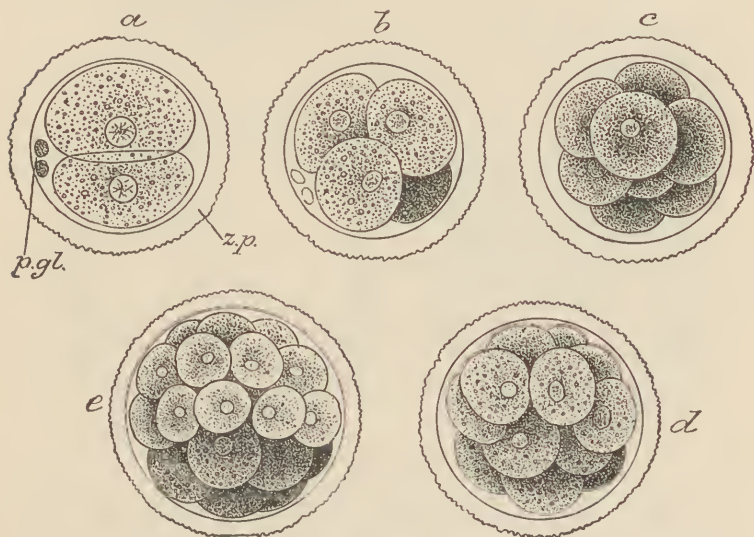


FIG. 19.—First stages of segmentation of a mammalian ovum. Semi-diagrammatic. (From a drawing by Allen Thomson.) *z.p.*, zona strata; *p.gl.*, polar bodies; *a*, two-cell stage; *b*, four-cell stage; *c*, eight-cell stage; *d*, *e*, morula stage.

Fertilization and the next stages in development have never been observed in the human body, but they can be

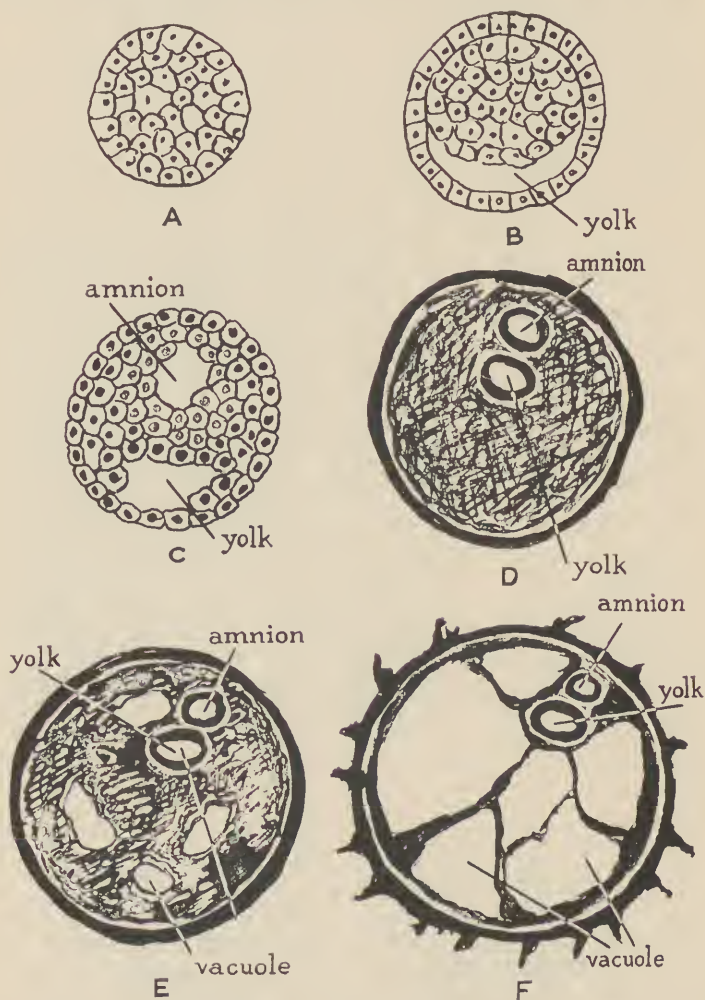


FIG. 20.—Sections through fertilized eggs showing *A*, the mulberry stage, *B*, the beginning of the yolk; *C* and *D*, the presence of the yolk and amnion; *E* and *F*, the vacuolization of the rest of the contents of the egg.

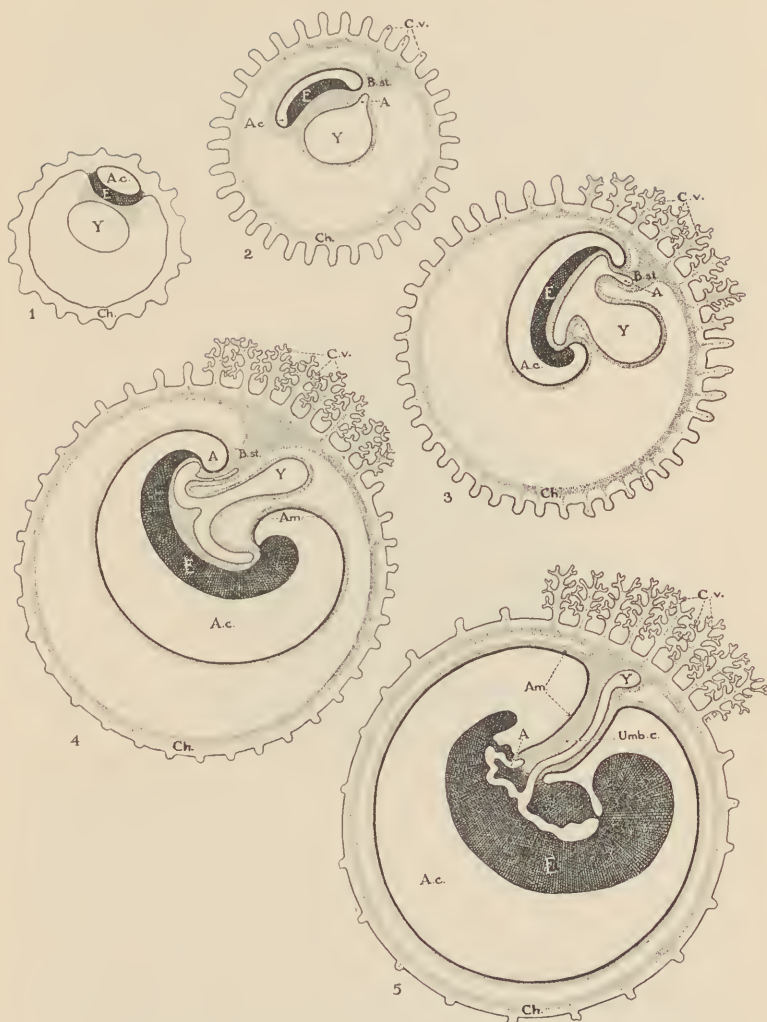


FIG. 21.—Sections showing the development of the embryo and umbilical cord. *A*, allantois; *A.c.*, amniotic cavity; *Am.*, amnion; *B.st.*, body stalk; *Ch.*, chorion; *C.v.*, chorionic villi in the region of the placenta; *E*, embryo; *Umb.c.*, umbilical cord; *Y*, yolk cavity.

carefully studied under the microscope in some animals: for example, the fish. Unfertilized fish eggs may be obtained by pressing them out of the female, and sperm cells are obtained from the male in the same way. The eggs and the sperm are brought together in a suitable medium and the changes studied under the microscope. We have no reason to doubt that the first stages in the development of the egg are essentially alike in all animals, and hence the description of the development of the human egg is completed by supplying the missing stages from the study of other animals.



FIG. 22.—Kroemer-Pfannenstieler Zygote. (From Keibel and Elize's *Normaltafeln*.) The embryonic region is folded into the form of an embryo, which is 1.9 mm. long, and it is possibly about three weeks old. At the lower end of the figure (the caudal end of the embryo) are seen portions of the chorion and body stalk. The cerebral portion of the neural rudiment is defined. Six pairs of mesodermal somites are present, but there are no signs of limbs.

Segmentation and Beginning of Yolk, Amnion and Embryo.

—After fertilization there is a resting stage which lasts for a few minutes and then comes the next step, segmentation, or division of the cell into two. In this process the nucleus always divides first, and then the protoplasm collects around each of the new nuclei so that two independent cells are

formed, both contained within the original cell membrane. We have now the egg in the two-celled stage.

After another short rest each of the two cells divides in the same way as the original cell, and we have the four-celled stage. In the same manner the division continues, some of the cells perhaps dividing faster than others until we have a mass of cells some larger than others, but quite small compared with the original cell. This solid mass of cells is called the morula or mulberry stage.

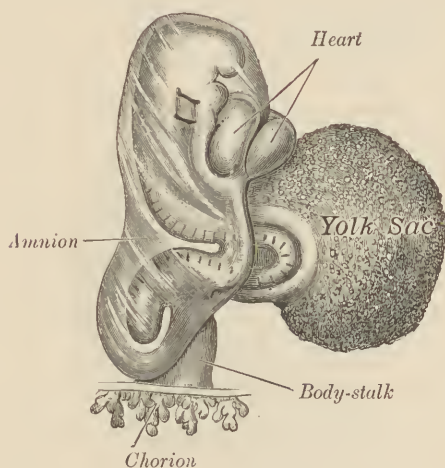


FIG. 23.—Human embryo about fifteen days old. (His.)

At this stage the development of the egg in viviparæ like the human species begins to differ from that in oviparæ like the fish and birds. Fluid begins to collect in two or more cavities within this cell mass. One of these cavities first to appear is the yolk cavity, whose contents are eventually absorbed by the embryo, and corresponds to the important yolk of oviparæ. Adjoining the yolk cavity appears the amniotic cavity, which subsequently develops so as to surround the embryo and practically comprises the main part of the fruit sac. Between the yolk and the amnion a mass of

cells appears in the second or third week, which is the beginning of the embryo.

Body Stalk.—Meantime by a process of vacuolization the cell mass, comprising the chief part of the contents of the egg, is more or less broken up outside of the embryonic mass and its adjacent structures. This mass is, however, firmly attached to the periphery of the egg by a mass of cells, which is known as the body stalk. Eventually it forms the path for the vessels, which connect the embryo and the fetus with the blood of the mother in the vessels of the mucous membrane of the uterus.

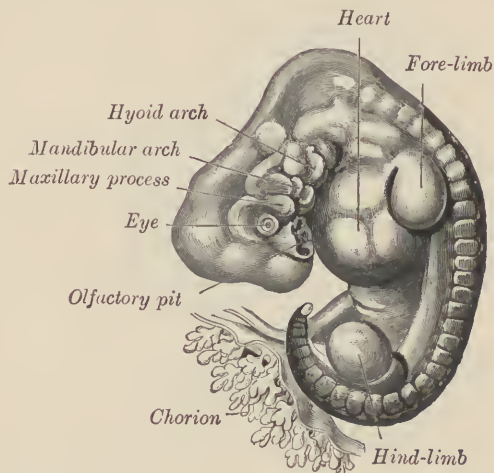


FIG. 24.—Human embryo, twenty-seven to thirty days old. (His.)

Embryo and Fetus.—As the mass of cells between the yolk and the amnion develops the embryo begins to assume definite form. The end farthest removed from the body stalk is enlarged and becomes the rudiment of the head. Two longitudinal folds appear on the convex amniotic side that are the rudiments of the nervous system. They eventually coalesce in the midline forming the spinal cord. The beginnings of the muscles appear as a series of blocks on each side. The body is now partly separated from the yolk,

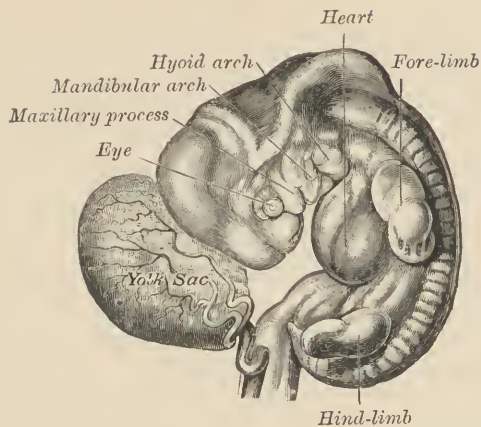


FIG. 25.—Human embryo, thirty-one to thirty-four days old. (His.)

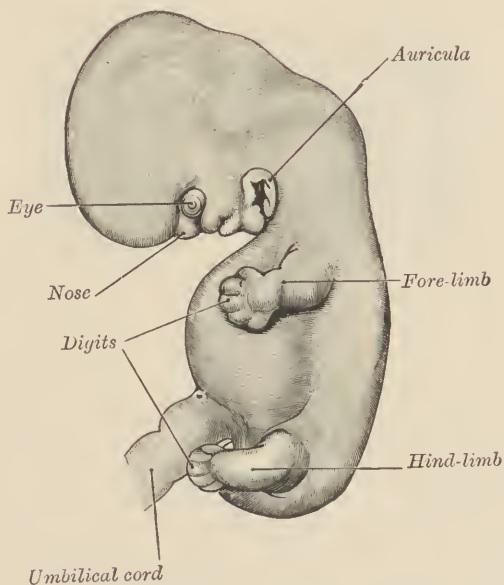


FIG. 26.—Human embryo of about six weeks. (His.)

by the folding in of the outer layer which forms the surface of the body. As the body is thus given its shape the various organs develop. The bloodvessels and heart with the blood appear very early. The primitive bowel is formed as a simple cavity on the under surface by the folding in of the outer surface and the separation of cells in the interior. Projections appear on the sides of the body which form the extremities. As soon as the embryo can be recognized as human it is called the fetus. This is about the middle of the second month of pregnancy.

We shall not attempt to describe further the growth of the fetus and the development of its parts and organs. It will be desirable, however, to show how the egg is fastened to the uterus from which it obtains its nourishment, and in so doing describe the fetal appendages, in labor called "after-birth." We must briefly study the chorion, amnion, yolk sac, allantois, decidua, and the placenta.

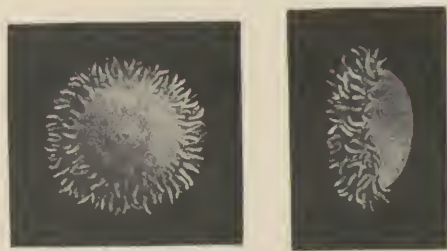


FIG. 27.—A young ovum magnified, showing chorionic villi. Seen from the side and from the edge. (Bunn.)

Chorion.—The chorion is the membrane formed by the outer layer of cells of the original mass of the mulberry stage and is continuous with the body stalk. It lies immediately in contact with the original cell membrane of the ovum. As the egg grows the original membrane disappears and the chorion becomes the outer coating of the egg. Its outer surface is covered with many short, stubby, branching projections called villi, which give the egg a shaggy look. Meantime the egg has been carried along the oviduct until it has reached the interior of the uterus. Here it burrows its way

into the mucous membrane of the uterus. The villi help to attach the egg to the uterus. After its attachment to one side of the uterus the villi next to the surface of the uterus, which also cover the area of the body stalk, enlarge greatly and help to form the placenta, while the villi covering the rest of the egg become rudimentary. Hence it happens that in examining the after-birth after labor the outer membrane, *i. e.*, the chorion, seems to be attached to the edge of the placenta. In reality the chorion is a continuous membrane and the placenta is developed in and upon it.

Amnion.—The beginning of the amniotic sac as an early cavity in the mulberry segmentation mass has been described above (p. 57). This cavity develops as the embryo grows until it finally encloses the embryo and fetus. At first it is separated from the chorion by a fluid, but eventually they come to lie in contact. At the attachment of the cord to the placenta the amnion is reflected over it and encircles it as far as the body of the child. The way the cord comes to lie outside of the amnion will be explained directly when we come to study the development of the allantois. The amniotic sac contains a liquid which is called the amniotic fluid or liquor amnii or fruit water. Its chief function is to furnish protection and opportunity for movement to the child.

Yolk.—The yolk is at first continuous with the primitive bowel cavity of the child. As the constricting fold of the surface of the body and amnion gradually forms the abdominal wall and encloses the bowel cavity it constricts that portion of the yolk sac next to the body into a thin stalk. This stalk becomes long and thin as the contents of the yolk sac gradually are absorbed, until it is a mere thread forming a part of the umbilical cord. The yolk serves as food for the embryo, but in the human it is of comparatively little importance. In fishes and birds it is very important, for it is the chief source of food for the growing embryo. At birth the yolk sac has entirely disappeared or is seen only as a small vesicle somewhere in the navel cord.

Allantois.—The allantois is an important appendage of the embryo, for it is the organ which carries blood from it to

the mother. It is formed as a projection from the hind end of the primitive bowel. This projection passes to the chorion through the body stalk. Its outer end spreads over that portion of the chorion which is attached to the uterus. The fluid at first contained in the sac of the allantois disappears and there remains only the base of the sac attached to the chorion and the stalk connecting it with the body of the embryo. In this stalk are the bloodvessels which carry the blood from the body to the extended surface lining the chorion. These vessels penetrate the villi and thus come into intimate relation with the bloodvessels of the uterus.

Umbilical Cord.—From this description it will be seen that the cord consists of the elongated stalk of the allantois combined with the rudimentary stalk of the yolk sac, surrounded by the amnion which, continuous with the skin at the small opening in the abdominal wall that allows the exit of the allantois stalk is reflected, at the outer end, over the internal surface of the placenta and chorion. (See p. 61.)

Migration and Nidation of the Egg.—Decidua.—Before describing the placenta it will be necessary to consider the changes that have been going on in the uterus during the growth of the egg. As soon as impregnation occurs the mucous membrane of the uterus begins to thicken, and when the fertilized egg reaches its cavity it finds the inner surface prepared for its reception. This change in the uterus is thought to be due to a secretion derived from the corpus luteum of pregnancy. (See page 47). The egg reaches the uterus probably about the end of the first week. It has been carried along the tube by the movements of the cilia which belong to the cells that line the tubal mucous membrane. Muscular contractions of the tube may also assist in carrying on its contents. The chorion has already become shaggy and the embryo is just noticeable. The egg penetrates the epithelial coating of the mucous membrane and is soon completely surrounded by it. Since this mucous membrane is cast off with the eggs at birth it is called the decidua. That portion of it which is reflected over the egg is called the decidua reflexa.

Placenta.—The chorionic villi are received into the decidua. Those next to the uterus develop and form the fetal part of the placenta. Those covering the rest of the surface of the egg become rudimentary, as has been said, and with their

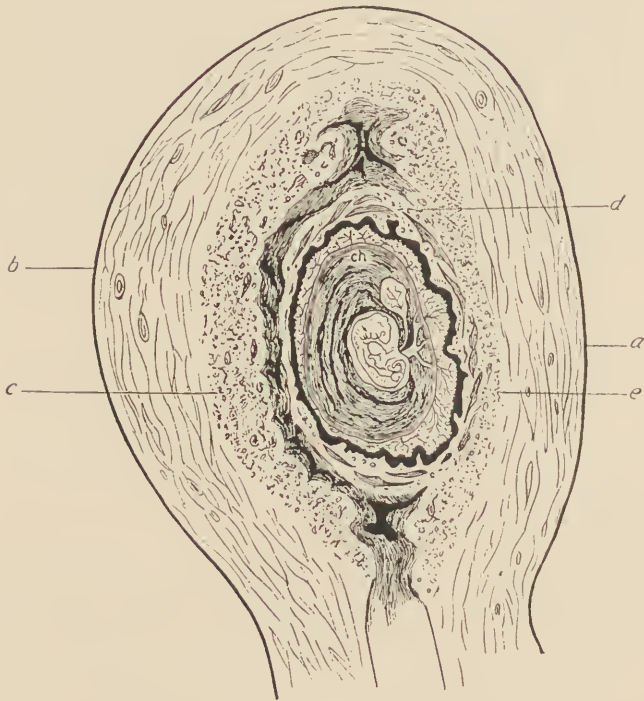


FIG. 28.—Semidiagrammatic outline of an antero-posterior section of a gravid uterus and ovum of five weeks. (Modified from Allen Thomson.) *a*, anterior uterine wall; *b*, posterior uterine wall; *c*, decidua vera; *d*, decidua reflexa; *e*, decidua serotina; *ch*, chorion with its villi.

disappearance the decidua reflexa also undergoes retrograde changes. The decidua corresponding to the attached surface of the egg forms the maternal part of the placenta. It becomes thickened and very vascular. The vessels surrounding the villi dilate greatly and become practically

blood channels, into which dip the placental vessels. Some hold that the uterine vessels rupture and that the escaping blood flows into spaces around the villi. In either case the blood of the fetus is separated from the mother's blood only by thin membranous walls. Through this membrane pass the food and oxygen from mother to fetus, while in the opposite direction pass the waste products, including carbonic dioxide. Thus the mother supplies the child with food and oxygen by means of the placenta. The placenta is therefore the lungs and stomach of the fetus. It is composed of two parts: the decidua, maternal, the chorion and allantois, fetal. These parts are separated as to their origin, but they cannot of course be pulled apart mechanically.

Relation of Mother to Fetus.—From the study of the relation of the mother to the fetus it appears that there is no nervous connection between them. The human embryo is a very sensitive being in the earlier stages of its existence; its attachment to the uterus is arranged for the purpose of affording it protection and food until it is sufficiently developed to live outside of the body. It is, however, an independent being from the first, as truly as is an embryo chicken. It is evidently impossible for the mother to influence the child by any mental impressions.

This subject is of some importance, for so many mothers have a firm belief in maternal impressions, or the possibility of influencing the child through mental impulses that much anxiety is caused through this belief. Most women expect to find their first child marked because of something they have seen during pregnancy. The first question which the young mother asks the physician or nurse is this: "Is my baby all right; is it marked?" On account of the widespread belief in maternal impressions and the unnecessary anxiety and unhappiness caused by this belief it is desirable that nurses should do their utmost to dispel this old notion.

Marks or deformities in new-born children are due to explainable and unexplainable causes. The red "mother marks" that are so often found on the skin are a kind of blood tumor. We do not know why they come any more than we know why other kinds of tumors appear in later

life. Some deformities of the fetus are due to conditions in the uterus. The fetus may be subject to pressure because of an insufficient amount of amniotic fluid. Such pressure may result in producing a misshaped head or body. Sometimes bands are formed by the fetal membranes which may constrict a growing limb and perhaps even amputate it. Such deformities are explainable, but are of course quite independent of the mother. A mother should be told that it is her duty to keep herself in good condition, to eat proper food, and to dress well for her own sake and for the good of her unborn child. If she is well the child will be well supplied with nourishment and develop properly. She should, however, be told that she need not fear maternal impressions.

CHAPTER III.

PREGNANCY.

A WOMAN is said to be pregnant while she is carrying the developing embryo. The average duration of pregnancy reckoned from the date of the beginning of the last menstruation is two hundred and eighty days, forty weeks, or ten periods of four weeks each, which are often but not correctly called lunar months. However there are considerable individual variations. Some women have a normal pregnancy period of ten to twenty days longer and some of a few days less than the average. It is probable that impregnation occurs in the majority of cases a few days after the end of menstruation. If the menstrual period lasts five days and conception occurs five days later, the average length of time from impregnation to the birth of the child would be two hundred and seventy days. When conception takes place two or three weeks after the end of menstruation, the method of finding the date of labor by adding two hundred and eighty days to the beginning of the last menstruation does not give us very exact results. In general, however, the mode of reckoning just given furnishes the best results.

We should naturally expect that pregnancy would cause a change in the entire body, and such we find to be the case. Some of these changes do not affect the health of the woman, and hence they may be termed physiological changes. Some, however, may cause disturbances more or less serious, and these we would call pathological changes, *i. e.*, changes producing disease.

PHYSIOLOGICAL CHANGES OF PREGNANCY.

Changes in the Uterus.—Very shortly after impregnation changes occur in the uterus. It becomes congested, *i. e.*, a

larger quantity of blood is sent to it, and the mucous membrane begins to thicken and grow. A brief description has already been given of the way in which the mucous membrane of the non-pregnant uterus is changed into the decidua of pregnancy. As the embryo develops the entire uterus enlarges. At the end of the sixteenth week it is so large that it lies chiefly in the abdominal cavity, *i. e.*, it has risen out of the pelvis. About this time, or a little later, the fetus has so far developed that it makes rather vigorous independent movements. These movements felt by the mother the first time are sometimes called quickening. It was formerly supposed that the child became endowed with life at this time.

Long before the uterus has escaped from the pelvis, and causes an enlargement of the abdomen, the pregnant woman has felt that her clothes are too tight, and noticed that she is larger than formerly. This enlargement is mostly due to distention of the bowels. The congestion of the uterus and other genital organs often lead to some constipation, and with it fermentation in the bowels occurs, causing the abdominal distention. This is not a necessary result of pregnancy, but it is so common and frequently confounded with enlargement of the uterus that it is worthy of mention.

As the uterus enlarges from week to week its base rises higher and higher, reaching the navel by the end of the twenty-fourth week, until toward the end of pregnancy it has reached nearly to the breast bone, the organ lying in contact with the stomach and liver (Fig. 29). It is a curious fact that as the base of the uterus ascends the white line which runs along the center of the abdomen, called the *linea alba*, becomes darkened, and is then named the *linea nigra*. Frequently the skin becomes stretched, and tears which have the appearance of scars occur in the tissue that is underneath the outer layers. They are called *striæ*.

About two weeks before labor the head of the child may descend into the lower segment of the uterus and sometimes into the pelvis. This allows the base of the uterus to descend from its highest position, and is called the falling or settling or sinking of the uterus.

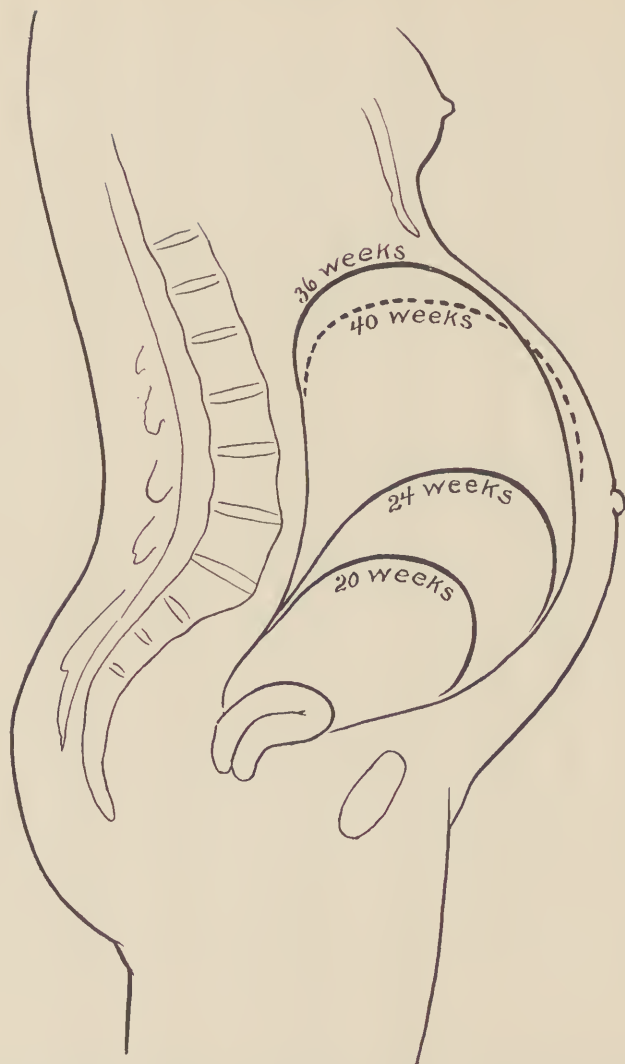


FIG. 29.—Diagram showing size and height of uterus at different periods of pregnancy.

Changes in all the Genital Organs.—Not only the uterus but also the vagina and the other genital organs become congested when impregnation occurs. This congestion of the vagina deepens its color to a deep blue or purple. The uterine ligaments, especially the round ligaments are increased in length and size.

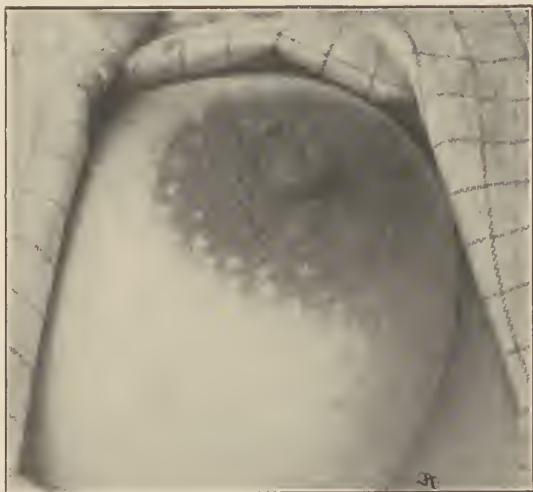


FIG. 30.—Breast of pregnancy or lactation showing Montgomery's glands and areola.

Changes in the Breasts.—In the first pregnancy there is generally a marked development of the breasts. The enlargement sometimes leads to such a stretching of the skin that striae appear similar to those in the skin of the abdominal wall. The breasts not only become permanently filled with blood, but new glandular tissue forms. A secretion, the colostrum appears, which may be expressed from the nipple or sometimes shows spontaneously. The areola outside of the nipple darkens, the little circle of glands, surrounding the nipple, called the glands of Montgomery also become prominent (Fig. 30). In the latter pregnancies similar changes

occur except that there is no development of new glandular substance.

Coincident with these changes in the genital organs, occur certain changes in the entire body that need not be described in detail. It is, however, well to mention that an increased sensitiveness of the central nervous system generally exists. It becomes more sensitive to external stimulation; particularly is it more sensitive to stomach irritations. The bearing of this change in the nerve centers on the diseases of pregnancy will shortly appear.

One of the noticeable changes of pregnancy, and to the woman frequently, the first sign of her pregnancy is the cessation of menstruation. There is no true menstruation after pregnancy occurs. Any discharge of blood during pregnancy is always suspicious. It usually indicates either a threatened abortion or an improper location of the placenta.

PATHOLOGICAL CHANGES OF PREGNANCY.

Nausea and Vomiting.—Nausea and vomiting are so common that they are often considered necessary accompaniments of pregnancy. That, however, is not true. About one-third of all pregnant women escape this trouble and no doubt proper management of pregnancy would reduce the amount of nausea considerably. It is proper then to call this symptom pathological and not physiological.

In mild cases there is only a feeling of nausea on getting out of bed in the morning. Hence arises the common term "morning sickness." When the trouble is a little more severe, vomiting also occurs at the same time. Later in the day nausea disappears and the patient is able to eat and retain lunch and dinner. In still more severe cases the nausea lasts all day, and sometimes the patient is unable to retain any food. In these latter cases we have what is called excessive or pernicious vomiting. Sometimes the technical terms, emesis and hyperemesis, corresponding to vomiting and excessive vomiting, are used.

Nausea and vomiting occur generally in the first three or four months of pregnancy and disappear completely in the

later months. Nausea sometimes begins during the first month before the patient by the failure of menstruation has become aware of her pregnancy. Generally it is noticed in the early part of the second month. Occasionally the nausea continues throughout the entire pregnancy. Nausea beginning in the later months of pregnancy is generally of a different kind from that occurring in the beginning of pregnancy, and due to other causes.

While it would be impossible to enter into a satisfactory discussion of the causes of the vomiting of pregnancy, it is desirable to mention that a poor circulation of blood is an important factor. The congestion of the pelvic and abdominal organs means that an unusual amount of blood is accumulated in them. It follows that less blood is in other parts of the body. The extremities are apt to be cold. Less blood is sent to the brain. There is a condition resembling chronic shock. The brain centers become particularly sensitive to outside irritation. The vomiting center is easily excited. The heavy, congested, perhaps misplaced uterus, or the constipated bowel or the stomach or intestine distended by fermentation gases, are sources of irritation.

Management of Emesis.—The responsibility for the management of severe cases of nausea and vomiting must be of course with the physician. It would be well if every woman would consult her physician at the beginning of pregnancy. Much of the discomfort which so many think a necessary accompaniment of pregnancy could be prevented by proper hygienic management. It often happens, however, that the physician is never consulted in mild cases, while a nurse often has opportunity to give good and valuable advice. Hence it is desirable that she should know what should be done in simple cases. The line of management is easily discovered from a consideration of the cause of the trouble. A good circulation is most important. The overfilled pelvic and abdominal organs should be relieved by the stimulation of the circulation in the surface of the body. In the morning the patient should remain in bed in the horizontal position until a good circulation is secured. One of the best means is for the patient to take a hot drink, a cup of hot milk, for example,

while in bed. In half an hour she may be able to get up without much trouble. She should spend but little time with her toilet. Let her get out of her room into the fresh air as soon as possible. Then let her take a light breakfast. Sometimes it is best for her to take breakfast in bed. In addition, she must care for the excretions. She must under no circumstances allow herself to become constipated. The management of constipation if it is at all obstinate must be left for the physician. She must dress warm in order that the skin circulation may be kept in good condition. By attention to these rules the ordinary cases of nausea and vomiting can be satisfactorily managed.

Management of Hyperemesis Gravidarum.—Although in pernicious vomiting the physician is in charge the outcome will depend very much upon the nurse. Hardly any other kind of a case tests as does this the nurse's skill, tact, courage, and endurance. The neurotic element is predominant in the causation of this disease. The majority of patients are hysterical, and those who have never had well-marked hysterical attacks have inherited a sensitive nervous organization that makes it difficult for them to withstand the strain of pregnancy. Frequently the patient did not want to become pregnant and would like to have an abortion produced. She has been accustomed to have her own way and rebels against all measures of restraint. She easily becomes panicky, fears death, and requires constant moral support to keep her from despair. At the same time the husband, other relatives and friends, who are all accustomed to gratifying every whim of the patient, give no help in the management, but on the contrary seek to interfere through sympathy for her or through fear for a fatal outcome.

It is preferable to have such a patient in a hospital. There she expects to find a certain routine and is prepared beforehand to submit. The interference of friends is mostly absent. The nurse can get more help and relief from constant attendance, and she can also get moral support from the superintendent of nurses.

If the patient remains at home the first thing for the nurse to do is to get control of the situation. If she has had experi-

ence in the care of nervous cases she has a great advantage. She must be very kind and very patient. Often she must regard her patient as an irresponsible, spoiled child and pay no attention to her moods. She must be always cheerful and radiate encouragement and hope and confidence.

The treatment of the physician will probably consist in absolute rest in bed, withdrawal of all foods and liquids by the mouth, cleansing and nutrient enemata, perhaps stomach lavage and medicine to produce sleep. The patient is kept in the horizontal position without a pillow, or with only a very small pillow because this position favors the flow of blood to the brain. Sometimes it is desirable to lower the head by raising the foot of the bed. All attempts at vomiting must be avoided as much as possible. They do only harm. Frequently a little ammonia water, smelling salts, alcohol, or vinegar held before the nose will prevent a vomiting attack. If the vomiting attack cannot be stopped, the patient must not be allowed to sit up and retch violently. Instead, the nurse must turn her gently to the side and support her head just over the edge of the bed. The patient should be encouraged to control the retching and resume the dorsal position as soon as possible. Some volatile stimulant like ordinary smelling salts will often aid in such control.

Taking nothing into the stomach is frequently the quickest and best way to success. Should this order be given the nurse should carry it out strictly, of course. Sometimes the physician allows the patient 5 to 10 drops of water in the mouth every ten minutes. This amount is absorbed before reaching the stomach. The great thirst from which the patient suffers is relieved by enemata. Normal salt solution or better hypotonic salt solution enemata are given for this purpose. Each day one large enema of 2 to 4 quarts can be given to clean out the bowel and two or three small enemas of 6 to 8 ounces to be retained. Salt solution may also be given by the drop method. Of course all of these must be given with proper technic in order to avoid disturbing the patient as much as possible and to be efficient. The temperature of the solution and the rate of injection must be considered. A large injection should be given with a rectal tube and the

patient should lie with the hips elevated. When cramps occur the flow should be stopped, the irrigator tube disconnected from the rectal tube and some of the injection or eventually gas should be allowed to escape from the latter until the patient is comfortable, then the injection should be resumed.

Sodium bromide is sometimes used in proper doses to replace the sodium chloride or common salt in the salt solution when the quieting effect of the bromide is necessary. Other sedatives or hypnotics may also be given in solution.

Some physicians add small doses of alcohol to the enema for its stimulating effects and also as a food. Nutritive enemata containing milk, eggs, digested meat, etc., are undesirable in this condition. They have no food value for they are not digested in or absorbed from the rectum or colon, and render these passages irritable after a short time. Alcohol has a considerable food value, 2 ounces being equal to about 20 ounces of milk, and it has the great advantage that it is readily absorbed and does not in proper dilution disturb the bowel.

The only other food that needs no digestion and can be absorbed from the colon and rectum is glucose or grape sugar. This may be given in a 4 to 10 per cent solution together with alcohol either by the drop method or in small frequently repeated enemata.

Under no circumstances should the nurse try to carry the tube into the colon unless she is expressly directed to do so by the physician. The so-called colonic flushings are almost always delusions. It is very difficult to carry the tube through the sigmoid above the brim of the pelvis. It generally coils around in the ampulla of the rectum and may injure the mucous membranc of the bowel or irritate the uterus.

The stomach frequently contains large quantities of mucus and sometimes the contents of the intestine have been carried back into the stomach by reverse peristalsis induced by vomiting. This mass is foul and irritating, made worse by fermentation set up by numerous yeast germs. It is not completely emptied by vomiting. Therefore it is often a

good plan to wash out the stomach. This procedure may have also a very good moral effect on the patient. Frequently the lavage is followed by the introduction of milk. It is somewhat remarkable that a patient can retain and digest $1\frac{1}{2}$ pints of milk introduced into her stomach without her knowledge, while she could not retain a $\frac{1}{2}$ ounce taken by the mouth.

The induction of abortion for the pernicious vomiting of pregnancy is almost never necessary when the patient can be properly managed. Patients and their friends are only too ready to demand this extreme measure. The nurse should under no circumstances suggest it. On the contrary, she should always encourage her patient, for the most extreme cases, if uncomplicated, have very good chances. The treatment may last some weeks, generally, however, not more than two or three, and then recovery is apt to be very rapid.

Constipation.—Constipation is a condition so common in pregnancy, and at the same time so important as a source of disturbance during pregnancy, and during childbed, that it is well for a woman to know its importance in order that she may be alert to avoid it and its consequences as far as possible. Pelvic congestion, lack of the usual exercise, changes in diet, and in the later months, pressure of the large uterus on the colon, are the chief causes of constipation. Distention of the bowel by fermentation gases is one result. Chronic poisoning of the body by absorption of poisons from the sluggish bowel is another. In the later months of pregnancy, the gases may cause considerable disturbance by interfering with breathing. In childbed vigorous efforts to remove the accumulation of feces sometimes causes considerable poisoning, leading to fever. Constipation may be prevented by attention to diet, daily habits, exercises, etc. Drinking freely of water, eating laxative foods and as much fresh fruit as possible are often sufficient. A cup of hot water with a little salt taken fifteen to twenty minutes before meals is beneficial. The further management of constipation should generally be left to the physician. Taking of strong cathartics should under all circumstances be avoided, for they may lead to abortion.

Dental Caries.—Occasionally a pregnant woman is troubled with a rapid decay of the teeth. It is a common idea that the substance of the teeth is absorbed for the purpose of furnishing matter for the bones of the child. This is a mere fable with no scientific foundation. The ordinary causes of tooth decay, that is, poor circulation in the gums, lowered resistance of the tissues and the presence of bacteria are particularly active during pregnancy. To prevent decay, a woman should be particularly careful to keep the mouth in good condition, using a mild antiseptic tooth wash and a brush freely. She should also consult a dentist at the beginning of pregnancy and have all cavities filled. She should inform the dentist of her condition, and he will of course avoid giving her long sittings, or causing her much pain. For large or painful cavities, temporary fillings should be used. A hopelessly bad tooth should be extracted.

Nephritis of Pregnancy.—Changes in the kidneys are perhaps the most important pathological changes that occur during pregnancy. These take place chiefly in the latter part of pregnancy. The kidneys become temporarily inflamed and fail to excrete properly. Sometimes the amount of urine passed is very much decreased. Again the quantity of urine may be normal but the amount of solids is greatly lessened. The kidneys may also allow the passage of albumin from the blood into the urine. This is called albuminuria.

As a result of this deficient action of the kidneys, the waste products of the body begin to accumulate and to produce symptoms of poisoning. As a result of changes in the blood and in the circulation, fluid collects in the tissues outside of the bloodvessels and we have general edema or dropsy. This is most marked in the lower extremities, especially during the day when the patient is on her feet. In the morning there is swelling of the face, which is especially noticed under the eyes. If the trouble becomes serious, the skin swells and pits on pressure. The internal organs also become edematous; for example, the breathing becomes difficult, on account of the edema of the lungs.

Other results of this self-poisoning or auto-intoxication by the waste not excreted by the kidneys are headache,

dizziness, disturbance of vision, and sometimes nausea, vomiting, and diarrhea. This nausea and vomiting occurring late in pregnancy resulting from kidney disease is quite different in its nature and importance from the so-called "nausea and vomiting of pregnancy" that have already been described.

With the appearance of headache and disturbance of vision the condition becomes very threatening. The patient is in great danger of that most dreaded of all complications, eclampsia, or convulsions. These convulsions are quite similar to uremic convulsions occurring outside of pregnancy due to disease of the kidneys.

Disease of the kidneys is not the only factor, however, in the causation of eclampsia. One of the functions of the liver is the breaking up of poisons so that they may be excreted by the kidneys. This function is often interfered with in pregnancy because of changes in the liver caused by the same poisons that injure the kidneys.

Toxemia of Pregnancy.—According to the theory now most generally accepted, these poisons of pregnancy are produced by the egg or the fetus. As you have learned in the study of physiology, all living cells give off waste products which are poisonous. These are the so-called metabolic poisons. They enter the blood of the mother and must be eliminated promptly, else they accumulate so as to poison her tissues, especially the delicate nerve elements. Sometimes by reason of the rapid production of ovular poisons, for example, in twin pregnancy, or because of deficient activity in the liver and the excretory organs, the metabolic products accumulate and the condition of toxemia or blood-poisoning results. As these poisons tend to produce convulsions or eclampsia we call this disease *the eclamptogenic toxemia of pregnancy*.

This toxemia is really the cause of the liver and kidney disease. There are also changes in the blood and blood-vessels and in other organs and tissues of the body. The most marked symptoms of this disease are, besides the albuminuria already noted, edema, increased blood-pressure, disturbance of vision, headache, dizziness, nausea and

vomiting, and finally eclamptic convulsions. The latter should be regarded as a symptom denoting that the disease has reached its climax rather than as a disease itself.

Eclamptic convulsions occur sometimes during pregnancy when they may or may not bring on premature labor, or they may come on during labor, or lastly they may appear during the puerperium. The name puerperal convulsions, commonly used, would only apply to the latter. Whenever they occur they are of the same nature, and may be regarded as the outbreak of the nervous system, showing that it has been poisoned, so that it is beyond the control of the ordinary restraining influences. An eclamptic convulsion is a spasm of all muscles of the body. The patient is quite unconscious. The extremities, head and body, are in violent motion, while the face twitches horribly. If the tongue gets between the teeth, as often happens, it will be badly bitten by the movements of the jaw. The convulsion comes on suddenly. It lasts from one to two minutes, and ceases with the patient purple from the obstructed respiration and apparently very much exhausted. She generally remains in a comatose state for fifteen to thirty minutes, when she gradually regains consciousness and goes into another convulsion. The frequency and severity of the convulsions is an index of the seriousness of the case. Death may occur during a convulsion from failure of respiration or it may follow after several hours from exhaustion resulting from the poisoning.

The prevention of eclampsia requires the early recognition of the eclamptogenic toxemia. All of the symptoms above given are important, but albuminuria has always been considered most serious. Hence the study of the condition of the urine becomes one of the most important duties of the physician. The obstetrical nurse should be sufficiently informed on this subject to be able to advise the patient of the importance of a timely consultation with the physician, and particularly as to the serious meaning of the chief symptoms of headache, dizziness, and general dropsy in pregnancy. She may also be called to care for a patient threatened with convulsions, and may be asked to make elementary examinations of urine.

An accurate collection of urine is of first importance. It is necessary to know the quantity of urine excreted in twenty-four hours. Then a sample from the whole amount will give its average composition and tell the activity of the kidneys. The urine should be free from foreign substances, including the bacteria, that cause its decomposition outside of the body. Urine is generally collected in an ordinary chamber-vessel. This will answer if the vessel is scalded well and kept covered the whole day or during the period of collection. Then the urine is shaken up, well measured, and a sample of at least 3 ounces put into a perfectly clean bottle. In case there is no measure in the house a drinking glass may be used, measuring it by filling it with a bottle of known size, for example, a 2-, 3- or 4-ounce bottle. The ordinary larger drinking glasses hold about 8 ounces while the smaller ones hold 6 ounces.

Experience shows the necessity of explaining what is meant by collecting urine for twenty-four hours. It is not meant to collect the urine passed from the bladder, but the urine passed from the kidneys. Hence if we begin the collection at 8 A.M., for example, the bladder must be emptied at that hour, but the specimen not saved for it has been accumulating perhaps all night. Then all the urine passed until 8 A.M., the following day is saved. This represents the kidney excretion for twenty-four hours.

If the physician does not require the urine for twenty-four hours the nurse should always note on the history sheet the amount passed each time. A specimen of the urine passed at any time may be used for examination if the length of time of its excretion is known.

The examination that the nurse is sometimes required to make consists in the determination of the specific gravity, the reaction, and the presence or absence of albumin. To determine the specific gravity of urine or its weight compared with water the urinometer is used. This is a weighted glass bulb with a graduated stem reading from 1000 to 1040. The bulb put into urine, generally contained in a long, small, cylindrical vessel, sinks more or less according to the density of the urine. In average normal urine it sinks to

the 20 mark, which denotes that the urine is 20-thousandths heavier than distilled water, *i. e.*, its specific gravity is 1020. In taking this specific gravity the urine should be at the temperature of a living room, *i. e.*, about 70° F.

The chemical reaction of the urine is determined by litmus paper. Red litmus paper remains red in urine that is acid and turns blue in alkaline urine, while blue paper remains blue in alkaline urine and reddens in acid urine. Urine that is neutral, *i. e.*, neither acid nor alkaline, does not affect either kind of paper.

The heat test is used in examining for albumin. Albumin in urine, like the white of egg or most other kinds of albumin, coagulates when heated. To apply the test, a test-tube, an alcohol lamp or gas burner, a small funnel, acetic acid, and filter paper are necessary. The test-tube is filled one-half or two-thirds full of filtered urine and held slanting over the flame so that the upper part of the column of urine is heated. If albumin is present it shows as a more or less dense cloud in the heated urine, well contrasted with the clear cold urine in the lower part of the tube. If the urine is not acid a few drops of acetic acid must be added to it before applying the heat test.

In caring for a case of toxemia the nurse may be also required to take the blood-pressure daily or more frequently. Either a mercury or a spring instrument is used. The technic of applying the cuff or armband and reading the pressure when the pulse disappears is simple and should be mastered by every nurse.

In the milder cases of eclamptogenic toxemia of pregnancy the duties of the nurse consist in a careful observation of the patient, and teaching her how to carry out exactly the physician's directions. These include care of the diet, the excretions, and the regulation of the exercise. The diet is a more or less strict milk diet. Fruit in considerable quantities may generally be allowed. Starch foods like rice, etc., are also permitted if well cooked. Meats, including meat soups, are forbidden. In emergency cases it is best to withhold all foods for two or three days. The bowels should be moved two or three times a day. The skin is

kept in good condition by frequent baths and warm woolen clothing. The patient should never become tired. If she must remain much in bed she should have massage and passive movements to keep her in good condition.



FIG. 31.—Sphygmomanometer in use.

In most severe cases when, for example, there may be considerable disturbance of the respiration from dropsy of the lung it may be necessary to increase the excretion from the skin by giving the patient a sweat every day. For this purpose a hot wet pack or a hot-air or vapor bath may be employed. The hot-air and the vapor baths may be given in bed or with the patient sitting. In the latter case the tent is very cheap and convenient. The patient sits on a wooden-seated stool or chair, under which is the alcohol or gas burner. Over the flame may be placed a pan with plain or medicated water. If the vapor bath is given the patient should be carefully watched during the bath. If she becomes exhausted or dizzy the bath must be stopped. A cold compress on the head is generally agreeable. When the bath is finished the patient should be wrapped in a woolen robe or blanket and put to bed while rolled in blankets. There she should lie for half an hour, when she is to be well rubbed and dressed in warm dry flannels.

When a hot-air or vapor bath is to be given in bed the patient should lie upon or be wrapped in a flannel blanket. Over her is placed a frame extending from her shoulders to her feet. Covering this frame is a rubber cloth, or an oil-cloth, over which are blankets that are carefully tucked around the patient's neck. The hot air or vapor is introduced into the space surrounding the body by means of a small tube or pipe, like the pipe of a gas stove. A double pipe or one covered with asbestos, which does not get so hot on the outside, is better than a single pipe. At the foot of the bed a burner is placed, on which stands a vessel with liquid, in case vapor is to be used. The pipe is bent at right angles by means of an elbow, and supported by wire at the foot of the bed, conducts the hot air or steam under the frame. The patient must be watched as in the tent, and the after-care is of course the same.

Sometimes the ordinary wet pack is employed. This is generally used in emergencies, but when a number of sweats are given the tent or bed-frame is generally preferred. The technic of the wet pack is so well-known as to require no description.

If convulsions have already occurred, in the absence of the physician, the nurse should get the patient into bed, remove the clothing, wrap her in woolen blankets, and keep her from all external disturbance. No noise should be allowed, and no one except those needed for help should be permitted to remain in the room. During a convulsion the nurse must protect the mouth and tongue from injury by at once introducing a fair-sized wooden mouth gag. If the convulsion is very severe, and respiration stops, it may be necessary to employ artificial respiration. Under no circumstances should she give chloroform or other anesthetic unless ordered to do so by the physician. If the patient comes out of the stupor following a convulsion and wishes a drink of water that may be given, although the irritation of swallowing may bring on a convulsion. Nothing should be forced on the patient. While waiting for the doctor the nurse should never let the patient out of her sight. She may prepare what she thinks may be needed.

Some physicians manage eclampsia in the so-called conservative method, with elimination and sedatives. Others empty the uterus at once. For the former there will be required a frame and burner for a hot-air bath, hot irons or bricks for a hot pack, the necessary oil-cloths and blankets, etc. If an operation is made the nurse must prepare for it in some other room unless the patient be sent to a hospital. If labor has begun she will, of course, prepare for it as directed in the next chapter.

Frequent Micturition.—Frequent micturition or passing of water is a common disturbance of pregnancy. It may be due to congestion of the bladder or to pressure upon the bladder by the growing uterus. Frequent urination during early pregnancy, due to pelvic congestion, can sometimes be relieved by the frequent use of the knee-chest position. If a woman is troubled at night she may get relief by sleeping in the Sims' position or on her face. Later in pregnancy frequent micturition, due to the pressure of the large uterus, may during the day be helped by wearing an abdominal bandage.

Edema of the Legs.—Pressure of the enlarged uterus upon the return vessels from the lower extremities may cause edema of the legs. This should not be mistaken for general edema due to kidney disease. This is not serious, and may be relieved by wearing an abdominal bandage. If the swelling of the legs is considerable and troublesome they may be bandaged.

Varicosities.—Sometimes the pressure of the uterus also causes varicose veins of the legs and vulva. These distended veins may become so large and tender as to cause much suffering, and they may even burst, causing serious hemorrhage. Bandaging is here also the proper treatment; sometimes collodion is better for small areas or in locations where a bandage is hard to apply.

Signs of Pregnancy.—All of the physiological and pathological changes of pregnancy are signs of pregnancy. They are, however, only probable and not positive or certain signs. Cessation of menstruation, for example, which is one of the earliest and most important signs, may be due

to other causes than pregnancy. Its value as a diagnostic sign depends much upon the fact whether menstruation has been previously regular. Enlargement of the uterus may be due to a tumor. Nausea and vomiting are, of course, not necessarily due to pregnancy.



FIG. 32.—Varicose veins of the leg in pregnancy.

The physician or nurse is absolutely certain of the existence of pregnancy only when the head, body, or extremities of the fetus are felt, when movements are noticed, or when the fetal heart is heard. Even the mother cannot be trusted in all cases when she says she feels the child. Sometimes a woman ceases to menstruate, her abdomen gradually enlarges, she feels the movements of the fetus, and has in fact all the probable signs of pregnancy and so deceives herself and perhaps her physician that she makes all preparation for the confinement. At the expected time pains may begin and the physician be called only to find that the uterus is of normal size and that the supposed tumor of pregnancy is only a gaseous distention in an hysterical woman. Such cases, called pseudo-

cyesis, show the necessity of a careful examination before assuming a condition on the diagnosis of the patient.

Abortion.—The termination of pregnancy before the child is viable, *i. e.*, before it can live outside of the uterus, is called abortion or miscarriage. Premature labor is the

interruption of pregnancy after the child is viable. It is possible that a fetus of twenty-eight weeks may survive. Hence this is the date generally taken to distinguish abortion from premature labor. The term abortion is sometimes restricted to denote the expulsion of the egg before quickening or before the fetal movements are felt, *i. e.*, before the sixteenth to the twentieth week, while miscarriage applies to the expulsion between the date of quickening and the twenty-eighth week.

The causes of abortion are diseases of the mother or diseases of or injuries to the egg. Severe acute diseases, like pneumonia, typhoid fever, scarlet fever, etc., very frequently cause abortions. Among the chronic diseases that result in abortion or premature labor may be mentioned serious heart diseases, kidney diseases, and syphilis.

Women differ greatly in their liability to abortion. Some women can work hard in the house or field, take long drives or make journeys, dance or swim, suffer from falls or blows without danger, while a slight strain or a little unusual exertion will bring on an abortion in others. A woman in her first pregnancy does not know her own susceptibility, and hence she should be careful to avoid all those things that tend to cause trouble. If a woman has had one or more abortions she undoubtedly has a sensitive uterus which is easily irritated or excited to contractions.

The injuries to which the egg may be subjected are either accidental or intentional. Accidental injuries are such as may result from falls or severe jars to which the mother is subjected. These accidents may cause more or less separation of the egg from the uterus, or they may even rupture the membranes and thus allow the escape of the fruit water. When the egg is intentionally injured we have criminal abortion.

An abortion is said to be complete when the entire egg has been expelled from the uterus. It is incomplete if part of the egg is retained. The fetus may be expelled, but some of the placenta or the membranes may still remain in the uterus. In an incomplete abortion there is generally hemorrhage and discharge. A threatened abortion is a

condition where there is danger of expulsion of the egg, but where such an expulsion is not inevitable. There is present pain, due to uterine contractions, and hemorrhage due to some separation of the egg. Both symptoms may disappear and the pregnancy continue.

The treatment of either threatened or incomplete abortion is, of course, the function of the physician. He should be called immediately. Women are very often ignorant of the significance of the signs of threatened abortion. Pains are often attributed to disturbances of the bowels. It should always be impressed upon a patient that any pain of an intermittent character is very dangerous and demands instant attention. Any hemorrhage during pregnancy is also of serious import. If the nurse is called to a case of threatened abortion before the advent of the physician she should keep the patient absolutely quiet in bed in the horizontal position. Any discharge which occurs should be carefully saved for examination by the physician.

Physicians sometimes treat abortion by packing the uterus and vagina with gauze or cotton and subsequently removing the packing with the adherent placenta. The packing is generally made without anesthesia, but sometimes this is required. In other cases the contents of the uterus are removed with the finger or with a curette after preliminary dilatation of the uterus. Here anesthesia is nearly always required. The nurse may prepare for the operation so far as possible before the coming of the physician.

Extra-uterine Pregnancy.—Pregnancy outside of the uterus is one of the most serious pathological conditions. It occurs where there is some obstacle in the tube that prevents the passage of the fertilized egg into the uterus, but which is not sufficiently great to obstruct the passage of the spermatozoa outward from the uterus into the tube. The fertilized ovum begins to grow and becomes attached to the inside of the Fallopian tube. The thin tube wall distends to accommodate the ovum until it ruptures or the ovum eats its way through the tube wall. A rent is made in the tube which causes a rupture of the distended vessels and a very serious hemorrhage occurs. The patient may

die suddenly of the shock and hemorrhage from the rupture of the tube, or the hemorrhage may be checked temporarily by the formation of a strong clot. In a few hours or days the hemorrhage reappears and generally the patient dies unless she receives the help of the surgeon, who operates and removes the tube. In many cases of tubal pregnancy the egg becomes separated from the tube and is expelled from its outer end. This is called tubal abortion.



FIG. 33.—Double tubal pregnancy, showing rupture of the tube on the right side and tubal abortion on the left.

It is a peculiar fact that when pregnancy occurs in a tube the mucous membrane of the uterus undergoes somewhat the same changes as when pregnancy occurs in the uterus itself. If contractions in the tube occur or rupture takes place the uterus also contracts and tends to expel this lining membrane, which comes away in pieces or sometimes entire in the shape of a cast of the uterus. This fact often leads to a mistake in the diagnosis. A woman has thought herself pregnant and now has pain and some discharge from the uterus. She thinks she is having an abortion and the treatment, so far as the nurse or the patient is concerned, is the same as in cases of abortion. It consists in absolute quiet in bed. If there is much shock from the

hemorrhage the head must be lowered and warm applications applied. The necessity for immediate attention is very evident. The nurse should never forget the possibility of extra-uterine pregnancy in a case that is apparently an abortion attended with symptoms of shock.

The discharge of blood from the vagina during pregnancy is always a symptom of some serious trouble. Besides the two pathological conditions already mentioned, abortion and extra-uterine pregnancy, in which this occurs, there are also others equally dangerous. These are placenta previa, separation of the normally seated placenta, cancer of the cervix, and hydatid mole pregnancy.

Placenta Previa.—The placenta is normally seated in the upper part of the cavity of the uterus and does not reach to the internal os. Sometimes, however, it lies in the lower segment of the uterus and in front of the child, and this condition is called placenta previa. If it lies directly over the internal os so that it covers the cervix when that is well dilated it is called total or complete placenta previa. If it only partially covers the opening of the dilated cervix it is called partial placenta previa. When the placenta does not cover any of the opening of the cervix, but extends only to its margin or border, it is called marginal placenta previa.

The danger of this condition is due to the fact that when the cervix begins to dilate in labor under the action of the uterine contractions the attachment of the placenta to the uterus is more or less broken, and from the dilated region bleeding is likely to occur. The detachment and consequently the hemorrhage is greater when the placental implantation is complete.

It frequently happens that the preparatory pains cause sufficient detachment of the placenta to bring on a hemorrhage, so that the bleeding may occur before labor begins. It may occur any time during the last six months of pregnancy. When this is not the case it is often one of the first signs of beginning labor. If a nurse should, therefore, notice a hemorrhage at the beginning it ought to arouse her suspicion of placenta previa and she should instantly communicate the fact of the hemorrhage to the physician.

The management of placenta previa is, of course, the function of the physician. The only thing the nurse can do before his arrival is to keep the patient absolutely quiet. Anything that might excite or increase the uterine contractions should be avoided. The patient should, there-



FIG. 34.—Complete placenta previa. (Bumm.)

fore, remain absolutely quiet in a horizontal position. She must use the bed-pan and under no circumstances get out of bed or even sit up in bed.

In the meantime the nurse may prepare for the physician. He may conclude to tampon the vagina or perform some

operation. She should have everything in readiness for him so far as possible. She must have, of course, the necessary solutions for disinfection, and it would be well for her to have on hand gauze or sterile cotton for tampons. She should prepare the operating table and the douche.



FIG. 35.—Partial placenta previa. (Bumm.)

It may happen that a nurse may be left with a patient who has had one or more slight hemorrhages from placenta previa. Ordinarily this complication is a reason for the induction of labor. If, however, the child is not yet viable and the urgency seems not great and the patient is able to

keep a competent nurse by her constantly it may be decided to allow the pregnancy to go on for some weeks. When in charge of such a case a nurse must fully appreciate her responsibility and be ready to act if necessity requires. The directions will be given, of course, by the physician

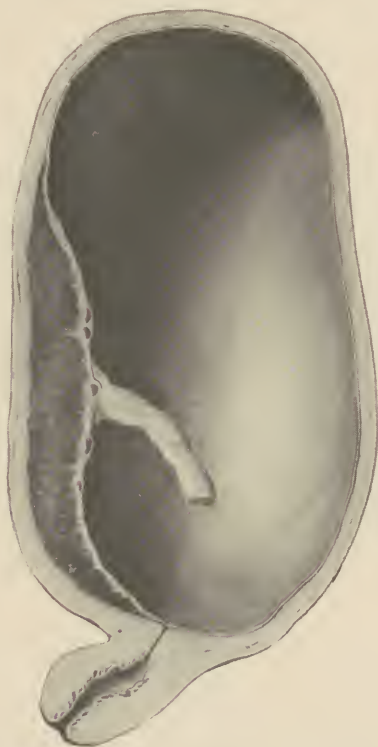


FIG. 36.—Marginal placenta previa. (Bumm.)

in charge. The patient, if allowed to be around the house, will be told to avoid everything that may bring on uterine contractions. She will avoid jar and blows as well as all accidents.

In case of hemorrhage, however slight, she will go to

bed and remain there. When the hemorrhage is severe the nurse may be required to introduce the tampons herself. The technic is as follows:

The nurse should disinfect her hands as directed in the chapter on Labor. The patient should be shaved and the genital region thoroughly disinfected. For the introduction of the tampons the nurse will require a good-sized retractor or a Sims' speculum and dressing forceps. These, of course, should be boiled. In a sterile bowl a 0.5 per cent carbolic solution should be prepared. For the tampons, sterile



FIG. 37.—Tamponing vagina in placenta previa. Insertion of retractor. Cotton tampons and forceps at hand.

absorbent cotton is needed, which should have been prepared in a sterilizer. In emergency they may be torn off from a sterile roll in pieces, each the size of the hand, dipped into the solution, the superfluous fluid squeezed out, and then placed on a sterile plate. A dozen to twenty of these tampons should be prepared. The plate should be placed on a table convenient to the bed. With the patient lying in the Sims' position the nurse inserts the speculum or retractor and pulls back well the posterior vaginal wall. Then taking a tampon in the dressing forceps she wipes out the blood from the vagina and then proceeds to pack

in the remaining tampons. In this position the uterus falls forward and allows the distention of the vagina to its fullest capacity. Two or three of the tampons are placed behind the vaginal portion of the cervix, another is placed in front, and then the remaining tampons are placed over the cervix and the entire vaginal canal is filled. When the outlet of

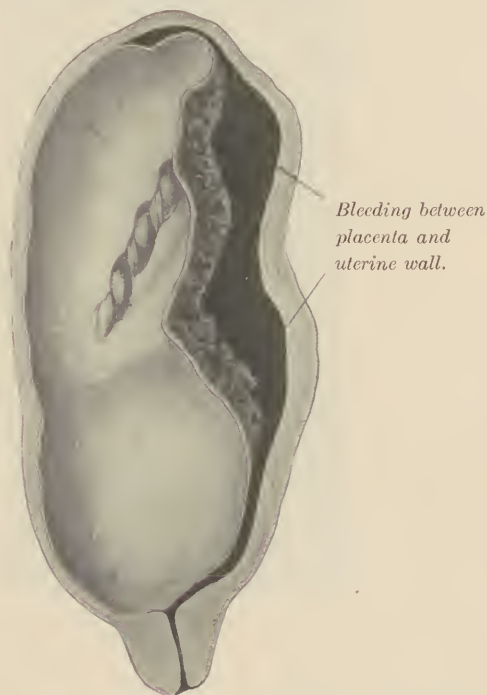


FIG. 38.—Premature separation of normally seated placenta. (Bumm.)

the vagina is reached the packing should stop. No tampons should be placed in the vulva, for they will irritate and cause unbearable pressure.

Separation of Normally Seated Placenta.—This condition is due to injury or disease. It is generally attended with a discharge of blood. The diagnosis between this condition

and placenta previa is not easily made. So far as the nurse is concerned the treatment consists only in keeping the patient quiet in bed and sending for the physician, who must assume all responsibility for the management of the case.



FIG. 39.—Hydatid mole.

Cancer of the Cervix.—A woman is not likely to become pregnant if she has cancer of the cervix in an advanced stage. A beginning cancer will develop with great rapidity during pregnancy, so that a bloody discharge is apt to occur before the end. The diagnosis is easily made by the physician, but the nurse, without an internal examination, can only bear in mind the possibility of this complication when she has to do with a case of hemorrhage during pregnancy.

Hydatid Mole.—This rare disease is due to a degeneration of the placental villi. The mole looks somewhat like a bunch of bleached-out grapes of various sizes. The embryo or fetus dies and the mole enlarges rapidly. It generally begins during the second or third month of pregnancy, and before the end of the fifth month the uterus is nearly as large as at term. Contractions are set up and the uterus begins to expel the mole. Some bleeding occurs. With the bloody discharge, pieces of the mole are sometimes found and their discovery confirms the diagnosis. The history of the rapid growth of the uterus, the absence of fetal movements and heart sounds, as well as the softness of the uterine contents, also help in the diagnosis, which is established by the physician by an internal examination.

MANAGEMENT OF PREGNANCY.

While the management of pregnancy is not the function of the nurse, still her opportunities for giving good advice are so numerous that it is very desirable that she be prepared with the elementary principles upon which are based the proper hygiene of this condition.

Diet.—There is a common notion prevalent that a woman needs to eat twice as much when she is pregnant as when she is not pregnant. The saying is: "She must eat for two, herself and her child." This, however, is not true. Very little extra food is required to supply the needs of the fetus. Moreover a pregnant woman, as a rule, takes less exercise and is less exposed to cold, and therefore needs less food for herself. The amount of food taken before pregnancy is quite sufficient during pregnancy.

The attempt has frequently been made to modify the growth of the fetus by varying the character of the food. It has been thought that the development of the fetus may be retarded by modifying the mother's diet and thus make labor easier. The attempt to keep the fetus small by restricting the mother to a starvation diet was at one time given a trial, but abandoned on account of the suffering thus inflicted on the mother and the poor results obtained. Later

the attempt was made to withdraw the bony matter from the child by keeping the mother on a fruit diet. It may be true that the labor is easier after such a diet strictly carried out. The child is less developed, but the explanation based on the theory of the bone salts is absurd. Fruit is not deficient in the bone salts, and the considerable quantity of fruit given in this diet contains probably quite as much of the bone salts as does an ordinary diet. The true explanation of the action of the fruit diet is that it is practically a starvation diet. The amount of nutriment contained in the fruit is slight in spite of the considerable quantity eaten.

The proper diet for a healthy woman during pregnancy is the ordinary mixed diet. It is best for the mother and for the unborn child. In case digestion is interfered with attention must be paid to the choice of food, so as to exclude all articles difficult of digestion. Since there is generally a slight diminution in digestive capacity it is well for the woman to avoid such things as are known to remain long in the stomach. For this reason great care should be observed in the use of salads, nuts, pork, smoked meats, fried meats and vegetables, as well as pickles, etc. Fruits are, as a rule, desirable. Many patients, however, find fruit acids harmful to the stomach and have to discard nearly all kinds of fruits.

Special care must be taken with the diet in cases of nausea and vomiting of pregnancy. Also in kidney disease a strict diet is often prescribed. These are pathological conditions and must be treated by the physician.

A pregnant woman often finds it necessary to eat more than three times a day. Frequently a light lunch must be taken in the forenoon and also in the afternoon, and occasionally it is desirable that something should be taken at night. In these cases hot milk is often prescribed.

Bathing.—The functions of the kidney, bowels, and skin are intimately related. To a certain extent one can take the place of either of the others. We all know that in warm weather when perspiration is free the urine is less free, and in cold weather when the skin excretion is checked the urine is more abundant. In pregnancy the care of the

skin is of much greater importance than most women think. Protection from cold by the wearing of warm and loose clothing and the use of frequent baths with friction are the measures needed to keep the skin in good condition.

The frequency, duration, and temperature of a bath depend somewhat upon the previous habits of the patient. If a woman is accustomed to taking a cold plunge every morning it is not necessary for her to change this habit, provided it does her no harm. If she is warm after the bath, if rubbing brings a glow to the skin, the bath is probably beneficial. If the previous history indicates that the patient has a tendency to abort, cold baths should be avoided. It is safer to prohibit all swimming and surf bathing, although some women who are accustomed to water can continue to swim for several months without danger. Frequent cleansing baths in tepid or warm water are needed under any circumstances. In the latter part of pregnancy it is sometimes difficult for a woman to get into a bath tub. In this case, or when she has no facilities for taking a tub bath, she must be satisfied with a sponge unless she can procure a shower bath.

Dress.—The dress of a pregnant woman should be warm, loose and light. Underwear of wool, silk and wool, or cotton and wool should be worn if the weather is at all cool or changeable. A light weight should, of course, be chosen in warm weather. The feet should be well dressed; fortunately thick-soled, sensible shoes are now in style. The chest and abdomen should not be constricted by corsets or tight waists. To support the skirts, a "corset waist" or any soft waist like a corset cover may be worn. For the breasts some find a special bust supporter satisfactory. Whatever is worn there must be absolutely no constriction about the waist. A corset so made that it constricts the waist must be laid aside as soon as the diagnosis of pregnancy is established. A proper corset, however, may often be worn with advantage through the whole pregnancy. Sometimes it must be made to order. Some corset makers now understand the principles which should determine a maternity corset. It should be as light and soft as possible,

with no more stays than are necessary to hold it in shape. It should be rather long and fit snugly around the hips. It should increase in size from below up so that the waist is bigger than the hip segment. The chest segment that supports the breast must also be perfectly loose. Provision must be made for enlarging the middle and upper segments



FIG. 40.—Side view of a good maternity corset at about the eighth month of pregnancy.

as pregnancy progresses. A proper corset thus becomes not only a support for the skirts and for the breasts, but also serves as an abdominal bandage to assist the abdominal walls in withstanding the pressure of the enlarged uterus.

The skirts should be as light as possible. With warm, tight-fitting underwear heavy skirts are unnecessary. The underskirt as well as the dress skirt must be made with

folds so that it, from time to time, can be made larger about the waist. The outer garment or both garments may, with advantage, be made in one piece.

Attention should also be given to the night-dress. A woman often disturbs the circulation of the skin by careless dressing at night. If she is obliged to get up and pass through a cold hall to a bath-room or water-closet she should be provided not only with a warm wrapper, but also with warm stockings and slippers.

If a maternity corset is not worn an abdominal bandage will be found of value during the last half of pregnancy. It also prevents the overstretching of the abdominal walls.

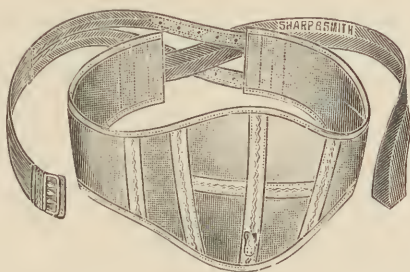


FIG. 41.—A good abdominal bandage for use during the latter part of pregnancy.

A number of good bandages are on the market, or a suitable bandage may be made out of strong cotton cloth or linen. As a rule no straps under the thighs are needed at this time to hold the bandage in place.

The abdominal bandage is specially useful in cases of women who have born several children and have pendulous abdomens. It also gives relief from the pressure symptoms of edema of the lower extremities, frequent micturition, etc. Sometimes violent movements of the child cause the woman much distress. Here also the bandage gives relief.

Exercise.—It is impossible to lay down a universal rule regarding the amount and kind of exercise that a pregnant

woman should take. Moderate exercise is almost always beneficial in that it improves the circulation of the blood and stimulates the activities of all tissues and organs of the body. It improves the appetite, helps digestion, and favors the regular movements of the bowels. The chief danger of exercise during pregnancy is that if excessive in amount or too violent it may bring on contractions of the uterus, resulting in abortion or premature labor. Abortion is much more easily induced in some patients than in others. Until a woman knows whether she aborts easily or not it is well for her to be rather careful in regard to exercise and watchful for the symptoms of trouble. She should not become tired and she must watch especially for the symptoms of backache and a bearing-down feeling in the pelvis. When she notices these symptoms she must at once lie down. If she finds that she is able to walk and ride without getting tired she will find such exercise beneficial. The danger is not generally in moderate daily exercise indoors or outdoors. It is rather the unusual exertion that a woman makes in an occasional shopping trip or visit, particularly as on such a trip she is apt to wear corsets that she has discarded at home for some weeks. She would better avoid dancing at parties or balls. Horseback- or bicycle-riding in the early stages of pregnancy is not unusually harmful for a good rider if she has studied her own case carefully as just described. Such exercise must, however, be undertaken only by a person who appreciates its dangers and watches its effects carefully. The same may be said of the use of the sewing machine. A careful woman may use the machine for half an hour at a time without danger; but if she should sew for half a day or a whole day at a time and become very tired she would be in danger. The lifting of heavy weights or straining the body in any way may be harmful. It may result in a partial detachment of the egg. That excessive caution that makes a woman afraid to lift her arms above her head is, however, unnecessary.

Toward the end of pregnancy some women find it impossible to walk or take other exercise without becoming very much exhausted. Encouraged by their friends to

continue they are brought to the verge of despair. This is not good. When exercise leads to exhaustion it should be given up. As a substitute, massage combined with passive movements is valuable. It relieves the edema which in these cases generally exists and improves the circulation better than exercise.

Care of the Breasts.—The breasts should be let alone until the last month or two of pregnancy. Manipulations are unnecessary and may bring on uterine contractions. Support should be given with a proper corset or waist. During the last six to eight weeks the nipples should be well washed with soap and warm water to remove secretions and then dried thoroughly with a clean towel. The secretion sometimes makes a crust which covers the nipple. If this is not removed until the nursing begins the nipple is found to be very tender and is easily infected. The daily cleaning and rubbing of the nipple puts it in good condition for nursing.

Some physicians advise washing the nipple with alcohol or some astringent solution to toughen it. Others advise the use of lanolin or some other lubricant to soften the skin of the nipple. The simple rule given above will be found satisfactory.

Sometimes it is advised to employ methods to develop a nipple when it is retracted or deformed. These measures are generally unsuccessful. The subject will be further discussed when treating of lactation.

CHAPTER IV.

LABOR.

LABOR is the expulsion or delivery or birth of the child and the fetal appendages or after-birth. Confinement is a term that has about the same significance, but refers especially to the disability of the mother. Likewise, the French term *accouchement*, *i. e.*, bringing to bed, and the English lying-in apply to the mother's condition rather than to her active efforts.

Labor at term is labor occurring about forty weeks or two hundred and eighty days from the beginning of the last menstruation or when the child has reached the normal size and development to begin life outside of the uterus. Premature labor is that occurring between the twenty-eighth week of pregnancy and term. Retarded or delayed labor occurs when pregnancy has lasted more than forty weeks. Sometimes labor has occurred three hundred and twenty days after the last menstruation. Very rarely labor does not come on at all; eventually the child dies and remains in the uterus. This is called missed labor.

Labor in its duration may be normal, slow, rapid, or precipitate. It is spontaneous when it terminates without assistance or artificial when some interference is required.

Eutocia and Dystocia.—In the study of labor we must consider the forces, the child or passenger, the passages and the mechanism. When all of these are normal we have normal labor or eutocia. When any of these are pathological we have dystocia. Dystocia may terminate spontaneously. Artificial labor is, of course, always dystocia.

Causes of Labor.—Much has been written about the factors which set up labor, but nothing is certainly known. Some have thought that the nerve centers that control the uterine

contractions are directly stimulated by toxins or poisons of some kind in the blood, while others hold that there is reflex action, the peripheral irritation being distention of the uterus, changes in the placenta, etc.

Forces of Labor.—The forces of labor are muscular contractions. They are of two kinds, involuntary and voluntary. The contractions of the uterine muscle belong to the first class and those of the abdominal muscles to the second class. The strength of the uterine contractions has been measured in various ways. It varies, of course, greatly. Normal contractions exert a pressure of from about 10 pounds to 25 pounds per square inch. Contractions of less intensity are abnormally weak and those of greater intensity are excessive. Practically we estimate approximately the strength of the uterine contractions by noting the degree of hardening of the uterus with the hand applied on the abdomen.

Labor Pains.—The uterine contractions generally cause suffering, and hence they are termed pains. The use of the word pain often leads to an apparently paradoxical expression. A strong or good contraction we call a good pain. It does not always happen that the contraction causes suffering any more than the contraction of the heart or stomach. Some women feel only the pain caused by the stretching or tearing of the vulva when the child is expelled. They have been almost or entirely unconscious of the contractions which opened the uterus and forced the child into the pelvis. Suffering is, however, such a usual accompaniment of the uterine contractions that we commonly speak of them as pains. Uterine contractions or pains occur at more or less regular intervals, separated by periods of rest. The contraction begins slowly and is perhaps not felt by the patient. The hand placed on the abdomen over the uterus notices a hardening of that body. It becomes shorter and thicker. If the woman is lying on her back the uterus rests against the backbone and projects more prominently toward the front. As the contraction increases in intensity it becomes more painful. The uterus is felt through the abdominal wall almost as hard as a stone.

After reaching the climax the contraction gradually disappears. By keeping the hand over the uterus and noting exactly the time of the beginning and the end of the contraction we notice that it lasts longer than the pain which the woman feels. A good contraction lasts from a minute and a half to two minutes. The pain is felt by the mother perhaps a minute.

Pregnancy Pains.—We may often observe uterine contractions during pregnancy. A cold hand placed on the abdomen over the uterus will often cause it to harden. During the last three or four weeks of pregnancy, spontaneous contractions at irregular intervals are the rule. They may occur every hour or two or they may occur several times in one day and not at all the next. They are sometimes noticed by the patient, but frequently cause her no suffering and are entirely unobserved by her. These pains occurring during pregnancy are often called preparatory or false pains. They partly obliterate the cervix and probably sometimes force the head of the child into the pelvis.

Stages of Labor.—Labor begins when the contractions occur with considerable regularity and continue until, in normal cases, the child is born. Labor is generally divided into three stages. In the first or opening stage the mouth of the uterus is dilated until there is almost no separation between the uterus and the vagina; they form one canal (Fig. 42). In the second stage the child is expelled from the body. In the third stage the after-birth is expelled.

First Stage of Labor.—In the first stage the pains are called opening or dilating pains. Only the contractions of the uterine muscles are here of value. The mother has little or no tendency to help with the abdominal muscles, *i. e.*, to bear down. Sometimes an ignorant nurse will encourage her to bear down. Such advice is unwise. The abdominal muscles can help but little, and the mother unnecessarily exhausts her strength.

As has been said, the contractions are not always felt. With the first child there is considerable suffering, and there need never be fear of the lack of warning. In subsequent labors, however, it is often important that the

patient should be informed that she may not feel the first pains much. Without this warning she may be too late in calling the nurse and physician. A woman who has easy labors should be instructed to watch closely for the uterine contractions when the time of her expected confinement arrives. She must report if she feels uncomfortable. The nurse, if she be present, can determine whether the discomfort is due to the beginning of labor or not by watch-

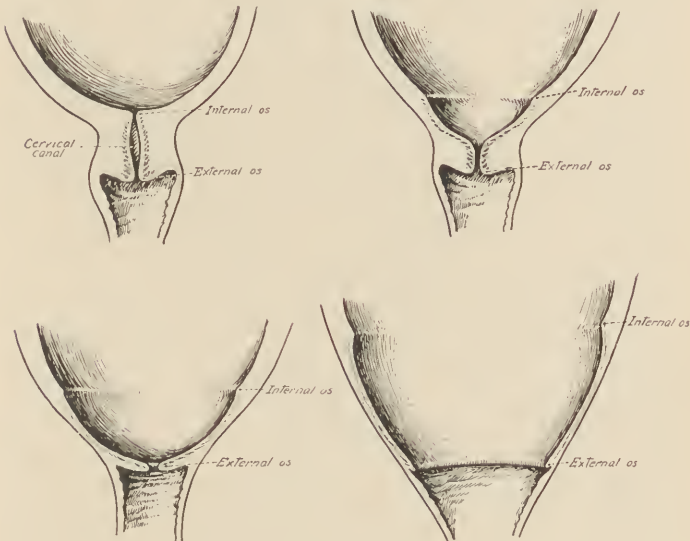


FIG. 42.—Effacement and dilatation of the cervix.

ing for the uterine contractions by placing her hand on the abdomen.

At the beginning of labor, pains occur every ten to thirty minutes. As labor progresses they generally increase in frequency and in intensity. The contractions may or may not cause pain in the back.

The first stage of labor may last from two or three hours to several days. In women who have never born children it is generally longer than in those who have had children.

With the first labor this stage lasts on an average fourteen to sixteen hours. In women who have had children it lasts from six to eight hours. Its apparent shortness in some cases is due, as just said, to the impossibility of ascertaining exactly when it begins.

Effacement of the Cervix.—The system of muscle fibers of the uterus is so constructed that when they contract they tend to pull open the internal os. The fibers of this region are, so to say, gradually pulled up into the lower segment of the body. The cervix becomes more and more funnel-shaped as the internal os is gradually opened. Eventually the projecting cervix disappears as the cervical canal becomes a part of the cavity of the uterus, forming a part at least of its lower segment. We say that the cervix is effaced or obliterated. Sometimes this effacement is effected by the preparatory contractions of pregnancy. When it is completed the dilatation of the external os begins (Fig. 42).

Formation of the Bag of Waters.—During the effacement of the cervix the wall of the lower segment of the uterus is more or less separated from the membranes which enclose the fruit and its waters. This causes a slight “first show” which is one of the first signs of the beginning of labor. It also results in the formation of the bag of waters. This consists of the free or separated portion of the membrane which projects into the funnel-like canal and later into or through the dilating os when distended by the uterine contractions. The distention disappears during the interval. The water which fills the bag is called the forewater, and is that portion that lies in front of the head. During a contraction the head is pressed against the side wall and like a valve cuts off the forewater from the rest of the fruit water. The bag during a pain may be hemispherical, glove-shaped, or pyriform. The contained fluid transmits the pressure equally in all directions and hence the bag is very valuable in the dilatation of the cervix.

Rupture of the Membranes.—The rupture of the membranes, or the bag of waters, may occur at any time during labor. It sometimes happens hours or even days before labor begins.

When it occurs before the beginning of labor the fruit water may drain away and we may have what is called a dry labor. In such a case the woman should remain in bed to



FIG. 43.—Formation of the bag of waters with the forewater. During effacement and dilatation of the cervix the head or presenting part separates the overlying membranes from the lower membranes which project into the cervical opening as a pouch or bag and contain the forewater.

prevent unnecessary loss of the liquor amnii. If the bag of waters breaks before the end of the first stage of labor there is said to be a premature rupture of the membranes.

If the membranes are very tough they may not rupture when the uterus is opened. Sometimes the head reaches the vaginal outlet before the membranes rupture, and it may be necessary for the physician artificially to tear open the bag in order to allow the escape of the child's head. A tardy rupture of the membranes delays labor. In absolutely typical cases the membranes should rupture at the end of the first stage of labor.

Second Stage of Labor.—The pains during the second stage of labor are called expelling or bearing-down pains. Here both the contractions of the uterus and of all of the abdominal muscles are brought into play. It is not necessary that the mother be instructed to bear down; she does it unconsciously. As the head is forced through the pelvis and approaches the outlet the vulva begins to open. The dilatation of the vaginal outlet causes a peculiar tearing pain. The cry of the woman is quite different from that in the early stage of labor. An experienced nurse or physician can often tell the stage of labor by the nature of the patient's cry.

The second stage of labor lasts from a few minutes to several hours. It is two or three hours long on the average in women who have never born children, and in subsequent pregnancies the average is perhaps one to two hours.

One can determine the exact moment of the complete dilatation of the uterus only by making an internal examination. For the physician this is often undesirable, and for the nurse such an examination is very seldom allowed. While it is not necessary to determine this moment with so great accuracy, it is, however, desirable to know approximately the stage or progress of labor. If a nurse is alone with the patient she wishes to be able to inform the physician concerning its progress. This she can do by observing the character of the pain and noticing when the bearing-down pains begin. The rupture of the bag of waters is also noted and reported. As the head passes through the cervical ring that is not completely dilated a tear, generally slight, frequently occurs which is attended with a show of blood. This may be called the "second show" and should also be

recorded. By external examination the nurse can find out whether the head has entirely entered the pelvis, and by pressing with the fingers behind the anus on each side of the coccyx she can tell whether the head is approaching the outlet.

Third Stage of Labor.—The third stage of labor may last from a few minutes to many hours. The greater part of the after-birth is often expelled from the body of the uterus into the cervix and vagina, where it remains held by the membranes which are not wholly detached. This partial retention of the placenta accounts for many cases of prolonged third stage of labor. Sometimes, however, the placenta is quite firmly attached to the uterus or the uterine contractions are too weak, and the third stage would be much prolonged if the spontaneous expulsion of the after-birth were waited for. In these cases labor is often completed by expressing or squeezing out the placenta with the hand so that the third stage is rarely allowed to last longer than two hours. The pains of the third stage are called after-birth pains. The uterine contractions differ considerably from those that occur in the earlier stages of labor. They are much longer and the resting intervals are shorter. A change is gradually taking place in the muscles of the uterus by which it becomes a hard, firmly contracted body.

After-pains.—After the completion of labor by the expulsion of the placenta the uterine muscle passes into a state of permanent contraction. This contraction causes no suffering. It occasionally happens, however, on account of the presence of blood clots or pieces of retained decidua which act as foreign bodies that the uterus is excited to renewed contractions. These are painful and have received the name of after-pains. They may occur at regular intervals and may last for three or four days. Anything which stimulates the contraction of the uterus may cause these pains: for example, kneading the surface of the abdomen with the hand or the application of the child to the breast. They may occur after the birth of the first child, but are more likely to be present after subsequent labors.

It will be seen that we have five kinds of uterine pains.

There are the preparatory or false pains which occur during pregnancy. Then during labor there are the opening pains in the first stage and expelling or bearing-down pains in the second stage and the after-birth pains in the third stage. Then finally in child-bed there are the after-pains.

MECHANISM OF LABOR.

By this term we understand the results of the action of the forces of labor applied in expelling the fruit from the uterus. Very briefly we describe the progress of the child through the obstetrical canal.

Posture.—Introductory to this description, however, we must define a few terms in common use. By the posture or attitude of the fetus we understand the relation of the various parts of its body to each other, *i. e.*, how the fingers are held, how the hand lies in relation to the forearm, how the forearm lies in relation to the arm, the arm to the body, etc. The normal posture or attitude of the fetus in the uterus is that of flexion. The head is somewhat flexed on the neck and the neck on the body. The body is bent on itself. The thighs are flexed against the body, the legs on the thighs, the feet on the legs. The arms are applied to the body. The forearm is flexed on the arm and the hand flexed on the forearm. In this attitude the child occupies the smallest possible space. It is the natural posture for a child to lie in when enclosed in a cavity of limited size. Sometimes, however, a deviation from this flexion attitude is found. It may be called a partial extension attitude. The head is extended on the body and the back bent backward instead of forward. This is the posture of the child in cases where the face presents instead of the top or back of the head. The posture of the child varies during its passage through the obstetrical canal.

Position.—By position of the child we denote its relation to the uterus. The position of the child is expressed by saying that it lies with its back to the left or to the right, to the left anterior or to the right posterior, etc. If the head presents we may denote position by using the back of the head or

occiput as the determining point. Thus we say the position is occiput left anterior (o. l. a.) or occiput left posterior (o. l. p.), etc. The position varies also during the passage of the child.



FIG. 44.—Sagittal section through the pelvis and uterus near the end of the first stage of labor, showing the posture of the child and also the bag of waters intact (A). (Bumm.)

Presentation.—By the presentation we mean that part of the child that precedes in its progress through the obstetrical canal or the part that is first felt when a vaginal examination is made. Thus we may have a head, a breech, a foot, an arm, a shoulder presentation, etc. Usually the head presents. Under head presentation we may also have the face or the brow presentation when the child lies in an

attitude of extension. In a typical labor some part of the skull presents. We distinguish here the vertex, the occiput, the fontanelle, etc. The presentation depends upon the attitude of the child. If the presenting head is well flexed the presentation is occiput. If the head is well extended the presentation is face. The position is independent of the posture or presentation. For example, the position may be o. l. a. whether the attitude be one of flexion or extension.

Station.—The head may be located in the inlet of the pelvis or above the inlet, in its excavation or in its outlet. The term station is used to denote the location or situation of the head or presenting part.

In our description of the mechanism of labor we shall describe first in some detail the progress of the typical head presentations. These comprise over nine-tenths of all cases of labor, and it is desirable that the nurse should understand them, for she is liable to be alone with the patient during a normal labor. In cases of abnormal presentation labor is usually very much delayed and the physician will be present and assume responsibility for the management. The nurse should be able to determine by external examination the presentation, position, and posture of the child, but she is not expected to conduct the labor in abnormal cases, and hence needs to understand its mechanism only so far as may be necessary to recognize deviation from normal.

Three kinds of movements of the fetus occur, namely, translation or movement of the fetus along the canal, flexion or movement on a transverse axis, and rotation or movement about a longitudinal axis. The progress may be described in four steps:

Descent.—The first step is the descent of the head into the pelvis. As has been said, this may begin during the last weeks of pregnancy if the opening into the pelvis is large as compared with the child's head and if the lower segment of the uterus becomes relaxed. By observing the shape of the inlet it will be seen that its cross diameter is longer than its antero-posterior diameter. It will also be observed that the antero-posterior diameter of the child's

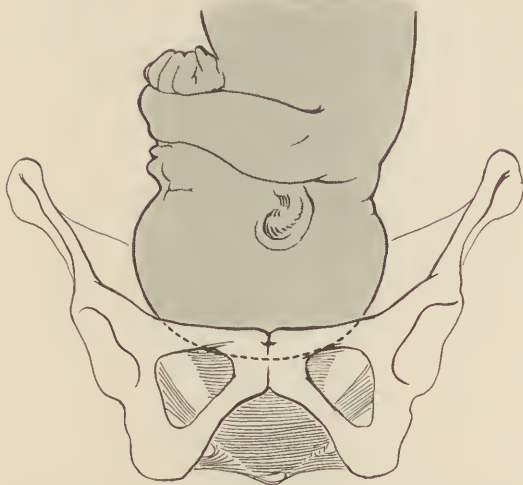


FIG. 45.—Diagram showing the status of fetus and pelvis at the beginning of labor. The presentation is vertex (flexion has not begun); position, occiput left (o. l.); station, above inlet.



FIG. 46.—Status during first step in the mechanism of labor. Descent has begun, accompanied by flexion. Presentation, posterior vertex; position, occiput left (o. l.); station, in inlet.

head, *i. e.*, the occipito-frontal diameter, is larger than the transverse diameter. It is therefore evident that when the

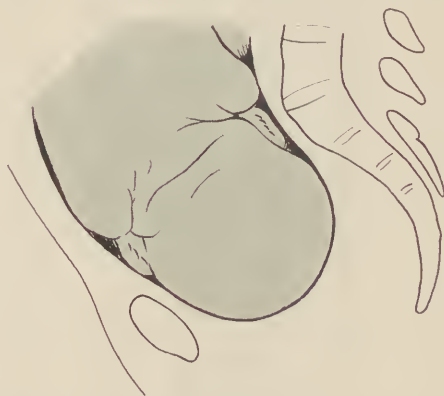


FIG. 47.—Sagittal section showing same progress in the mechanism of labor as Fig. 46.



FIG. 48.—Status during second step in the mechanism of labor, *i. e.*, rotation in progress. The presentation is posterior vertex; position, occiput left anterior (o. l. a.); station, head in excavation.

head descends into the pelvis its long diameter, which must coincide with the long diameter of the pelvis, must lie more

or less transverse, *i. e.*, the occiput must point to one side or the other of the pelvis. When the head has passed into the pelvis so far that its greatest circumference has passed



FIG. 49.—Status at the end of descent and rotation. Presentation is vertex; position, occiput anterior (o. a.); station, head in outlet.

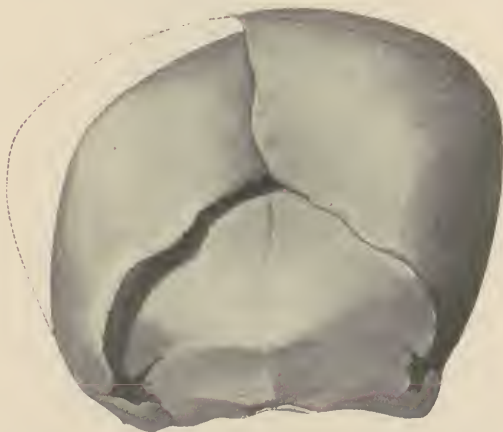


FIG. 50.—Fetal skull, showing displacement of bones in moulding as in Fig. 52. The right parietal bone projects over the left and both over the occipital. (Bumm.)

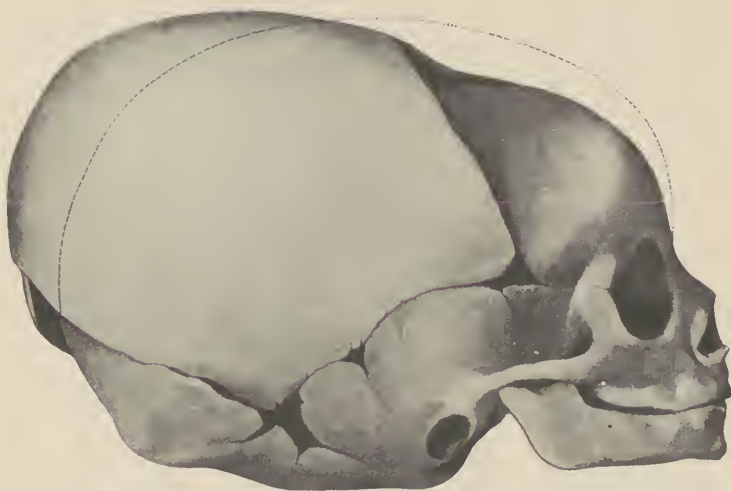


FIG. 51.—Fetal skull, showing displacement of bone in moulding as in Fig. 53. The parietal bones project over both the frontal and occipital. (Bumm.)



FIG. 52.—Moulding of fetal head during labor. Bone displacements shown in Fig. 50. Caput succedaneum also shown. (Bumm.)

through the inlet it is said to have descended or entered the pelvis (Fig. 48). Its station is in the excavation. During this step some flexion of the head may take place (Fig. 46). Some moulding of the head begins so that it fits the passage (Figs. 52 and 53). Likewise a swelling of the presenting part of the head may occur. This is called the caput succedaneum (Fig. 52).

Rotation.—The next step in labor is the rotation of the head. While the transverse diameter of the inlet is longest,



FIG. 53.—Moulding of fetal head during labor. Displacements of bone shown in Fig. 51. (Bumm.)

at the outlet the antero-posterior diameter is longest. Hence it is evident that the head which descends with its long diameter crosswise must now rotate so as to bring that diameter into the antero-posterior diameter of the pelvis in order that its expulsion may take place most advantageously. If the rotation occurs normally the back of the head or occiput is brought to the front; sometimes an abnormal rotation occurs by which the forehead is brought to the front or the occiput posterior. This is a great disadvantage, for it makes the expulsion of the head much more difficult. The

rotation occurs within the cavity of the pelvis and usually in the early part of the second stage of labor.



FIG. 54.—Sagittal section showing the beginning of the third step in the mechanism of labor or the exit of the head. (Compare Figs. 49 and 56.)



FIG. 55.—End of the third step in the mechanism of labor, *i. e.*, the exit of the head. (Compare Fig. 57.)

Exit of Head.—The third step in the mechanism of labor is the exit or expulsion of the head, which occurs with its extension. After the rotation of the head in the pelvis the

presenting part, *i. e.*, the occiput, is gradually forced through the vulva and appears close under the symphysis. When the pain stops the head recedes into the pelvis to appear again at the next contraction. Even before the head is visible in the vulva it can be felt by pressing with the fingers each side the end of the sacrum. By observing the perineum during the pain it is seen to distend. As soon as the vulva



FIG. 56.—Beginning of the third step in the mechanism of labor, *i. e.*, exit of the head. The perineum is distended and the head visible. (Bumm.)

begins to open and a trace of the head can be seen we say the head is visible. Often about this time the lower end of the vagina becomes stretched so much that a slight tear occurs attended with a show of blood. This may be called the “third show.” When the head advances so far during a pain that it does not recede into the pelvis in the interval we say that it has escaped from the bony pelvis. The vulva dilates more and more with each pain. The occiput pro-

jects more and more out of the pelvis. If the patient is lying on her back the presenting part which first pointed in the horizontal direction is now directed more and more upward. When the presenting part has passed from under the symphysis, so that the region below the occiput, *i. e.*, the subocciput, is applied to the symphysis, the condition is favorable for the birth of the head. More and more of



FIG. 57.—The head is about to pass through the vulvar ring in the suboccipito-frontal circumference. (Bumm.)

the head appears, the vulvar ring stretches, and finally slips over the forehead and over the face when the head is born. You will observe from this description and from the accompanying figures that this expulsion of the head is accompanied by an extension. Hence this process is also called extension.

Exit of the Body.—The final stage in the mechanism of labor is that of expulsion of the body. While the shoulders

descend into the pelvis lying more or less in the transverse diameter of the inlet, *i. e.*, generally with the back of the child toward the front of the mother, in the pelvis they rotate back again and are delivered with the back to one side. Sometimes the anterior shoulder comes out first under the symphysis, when the posterior shoulder follows over the perineum, while at other times the posterior shoulder is delivered first. After the birth of the shoulders the rest of the body slips out without any further trouble.



FIG. 58.—Exit of the body. The anterior shoulder is escaping first. Notice that the head is only supported by the hand; no traction is made.

Expulsion of the Placenta.—The methods of the separation and expulsion of the after-birth, *i. e.*, the placenta and membranes, are illustrated by the two accompanying figures. One is called the Schultze method, because it was well described by Prof. Schultze, the celebrated obstetrician and teacher of Jena, Germany. The other method was described by Duncan, a famous obstetrician of England, and so is called the Duncan method. According to Schultze the placenta begins to separate from the uterus in the middle. Blood collects in the space between the placenta and the uterine walls. This grows larger and larger as the separation

continues until the placenta is fastened only by a rim at the attached border, or perhaps only by the attached membranes.



FIG. 59.—Separation of the placenta by the Schultze method.

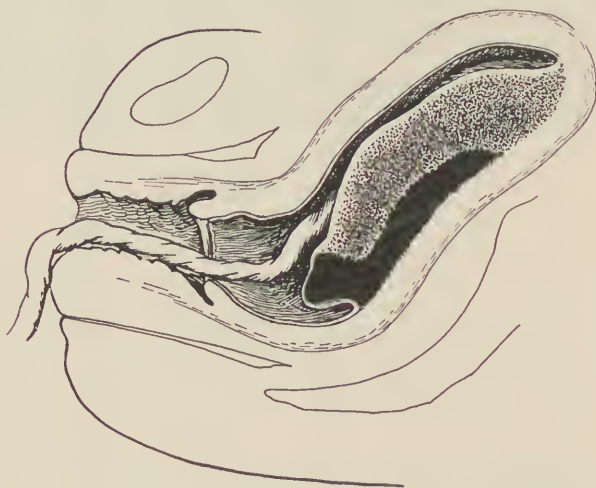


FIG. 60.—Separation of the placenta by the Duncan method.

At this stage the placenta is lying in the lower segment of the uterus. Finally the last adhesions to the uterus are severed and the mass is expelled from the body with the membranes and fetal side of the placenta on the outside, and the blood that was behind the placenta contained on the inside of the bag as it is now turned inside out. According to the Duncan mechanism the placenta begins to separate from the uterus at its lower edge. As the separation continues it is gradually expelled from the uterus with its uterine surface foremost, in which way it appears at the vulvar outlet. Both methods of expulsion are normal and occur with about equal frequency. By the Schultze mechanism there is generally no hemorrhage until after the placenta is expelled, when a large clot or quantity of blood comes in or with the after-birth. By the Duncan mechanism there is apt to be some hemorrhage during the process of expulsion.

MANAGEMENT OF LABOR.

In Hospitals.—Lately, in many cities and large towns, maternity or lying-in hospitals or maternity departments in general hospitals have been provided for the care of women in labor. When well equipped and well managed these are very desirable. Not only can normal labor be conducted with a minimum risk to the patient, but in case complications develop and artificial interference becomes necessary it can be made much more efficiently. Such hospitals are provided with a separate preparation room and delivery or accouchement rooms and with a technic that differs somewhat in the different institutions, just as the operating room technic may differ, but which conforms in general to the principles of asepsis and antisepsis. We shall not attempt to describe in detail hospital equipment and technic which must differ in accordance with the capacity of the hospital or department. Nurses during their training will become familiar with the technic in their own training schools. Since many labors still must be conducted in homes we shall here give special attention to the manage-

ment of labor in private houses, where all kinds of conditions will be met. The following directions, while contemplating the special needs of home cases, also comprise the essentials of hospital technic.

In Private Houses.—It is the duty of the nurse who is assisting in a case of labor to avoid infecting the patient herself, to prepare the patient and her bed so that she may not become accidentally infected, to prepare for all possible emergencies and to assist the patient as far as possible during labor. Certain general directions concerning the nurse's duties have been given already in Chapter I. If the nurse is not in the house when labor begins she has, as a matter of course, visited her patient and made herself familiar with the management of the house, and knows where to find the bedding and the patient's outfit. She has with her those things that are absolutely necessary for disinfection and for use about the patient in case of need in an emergency.

Nurse's Outfit.—The following articles make a fair outfit for the nurse:

Nail brush.

Tube or bottle of clean or antiseptic soap.

Nail file.

Scissors.

Glass and soft rubber catheter.

Glass douche point.

Bottle of sublimate tablets (7+ grains each).

Tape or ligature.

Aspirating catheter.

Hypodermic syringe.

Two fever thermometers.

Phonendoscope or stethoscope.

Rubber gloves.

Large gown.

Patient's Outfit.—Sometimes the patient purchases the supplies for dressings in bulk and the nurse prepares them. If sterile gauze and cotton are used and the nurse prepares the dressings antiseptically, subsequent sterilization is unnecessary. In most towns as well as cities there are, however, large hospital sterilizers where dressings, sheets, towels, and

gowns can be sterilized, and it is in general more satisfactory to have the patient send her sheets to be sterilized with the dressings and then have them kept untouched ready for use.

Under any circumstances the patient needs bowls, pitchers, etc., with certain druggist's supplies. Such a list should include the following articles:

One rubber or enamel 3-quart fountain syringe.

One enamel combination douche-pan and bed-pan.

Two or 3 enamel or china bowls.

Two or 3 enamel or china pitchers.

One slop pail or jar.

One bath thermometer.

Two large nail or hand brushes.

One nail file.

One bottle (25) sublimate tablets (7+ grains each).

Three ounces of lysol or compound solution of cresol.

One pint of alcohol.

Two hundred and fifty grams of ether.

One tube or bottle of antiseptic soap.

One ounce of fluidextract of ergot (or some other preparation for hypodermic use).

Three ounces of olive oil for baby.

One sac containing a sterile blanket, 1 yard square, with a sterile napkin and 4 large safety pins for receiving baby. (See page 282.)

Safety pins, large and small.

Rubber sheeting, 3 yards ($1\frac{1}{2}$ yards wide). This is cut so as to make two pieces, one, $1\frac{1}{2} \times 1\frac{3}{4}$ yards, to cover the mattress, and one, $1\frac{1}{2} \times 1\frac{1}{4}$ yards, to serve as a rubber draw-sheet or drainage sheet.

If the nurse makes the dressings she will need the following additional supplies:

Twenty-five yards of sterile gauze.

Four pounds of absorbent cotton.

Four yards of strong cotton cloth for bandages.

In addition the patient should have laundered and put away for use during and following the confinement:

One dozen sheets.

One and a half dozen towels.

Three pillow-cases.

Three night-gowns.

Three pairs long stockings.

One dressing gown or bath robe.

When the dressings are prepared and sterilized in the hospital the following list makes a satisfactory outfit:

Three packages of vulvar dressings, 1 dozen in each package (each dressing 18 x 8, taking gauze 12 x 36 and cotton filling 12 x 7, full thickness). (Twelve yards of gauze and 3 pounds of cotton.)

One package of perineal gauze sponges, each 9 x 9, four thicknesses (6 yards of gauze).

Two packages cotton sponges, 25 in each (1 pound of cotton).

One pound of sterilized cotton.

Five yards of sterile gauze in 1-yard lengths.

Two packages of bed-pads, 1 in each, 24 x 24, 2 thicknesses of cotton.

One pair of leggings.

Six breast bandages, 12 x 48.

Four abdominal bandages, 18 x 48.

Ligature of No. 8 silk, 28 inches long, in envelope.

Two 4-ounce bottles of sterile soap.

One nail file, 1 bath thermometer, 1 douche point, all sterile.

Two sterile nail brushes.

The outfits described cost from \$15 to \$30. A poor patient can save considerable in various ways. Newspapers are often used to protect the bedding and when they are clean and covered with a clean sheet they help in the clean management of the case. A piece of new white oil-cloth for additional protection and to use as a drainage sheet if required may substitute the rubber sheeting. The patient may get along with 2 pounds of cotton, and she may dispense with lysol and ether. She may use a syringe and bowls, pitchers and douche-pan that are already in the house, or she can borrow, for these can be sterilized by boiling before using.

Preparation of Self.—In order to avoid any danger of infecting the patient, the nurse should be as nearly clean as possible. She must be free from suspicion of any contagious disease. If she herself has had measles, scarlet fever, whooping-cough, mumps, erysipelas, or any other contagious disease she must not go to a case of obstetrics for at least a month after recovery, during which convalescence she must have taken numerous cleansing baths. Colds and la grippe are also contagious; it is certainly not desirable that an obstetrical nurse should be suffering from a severe cold. There is always danger that she will be the means of conveying it to the mother or child. If she has unfortunately contracted such a cold a few days before the expected confinement she should use all measures to cure herself, including gargles and spraying of the throat and nose.

If she has been in attendance on a case of contagious disease she should not go to an obstetrical case for a week during which time she should bathe frequently, and particularly wash the hair. If a quicker preparation is absolutely necessary, she should take a Turkish bath and wash the hair with utmost thoroughness. If she is very conscientious it may be possible for her to disinfect herself in a day.

When labor begins the nurse should put on clean wash clothes. It is well known that of all sources of danger the hands are much the greatest. It is not possible for a nurse to keep her hands sterile. During the labor she is obliged to handle so many things about the room that she is constantly contaminating her hands. Unless she is conducting a labor herself, and needs to touch the genitals of the patient, it is not necessary that she be absolutely sterile. When she is preparing the dressings or touching the patient she should be so clean that there is no danger of contamination. For this purpose it is better that she put on gloves. At all times, however, she must be sure that her hands are not contaminated with dangerous germs, *i. e.*, pus germs or those of erysipelas. For this reason it is proper that she should clean her hands as well as she can with soap and water before giving the patient her enema and bath, and then sterilize them before preparing the patient for her

examination. If she has thoroughly disinfected her hands at the beginning of labor and washes them frequently during the labor, especially when they become contaminated, she is doing her duty. If in the absence of the physician it is necessary that she should deliver the patient herself, she must, of course, see to it that her hands remain sterile and also wear gloves.

It is well known that the skin, even when ordinarily clean, is contaminated with innumerable bacteria. If an abrasion or other wound is made these bacteria cause an infection which results in an inflammation of greater or less extent, and perhaps in the formation of pus. While these germs are all over the surface of the body they are found in much greater numbers in some places than in others. About the hand they are found especially between the fingers and around the nails. If a person wears rings, they are found also in numerous quantities under the rings. A nurse should never wear rings.

The germs we especially fear are the ordinary pus germs, the germs of erysipelas and bacteria that are found in the feces, and the ordinary germs of decomposition.

While nine-tenths or more of the germs can be removed by the proper use of soap and hot water, yet some remain, and they must be destroyed or gotten rid of by certain chemical substances which we call antiseptics. The method of cleaning the hands is as follows:

Method of Cleaning the Hands.—First scrub the hands and arms with clean soap and hot water, using a clean brush, for ten minutes. The water should be as hot as can be borne. The soap must be clean. A cake of dirty soap, perhaps with numerous cracks, which is lying around the common house sink and has been used by everyone for weeks, is dangerous. The hands could even become contaminated by the use of such soap. A clean cake of any good soap will do. The soft or green soap which contains a small amount of antiseptics, put up in collapsible tubes, is a very convenient and safe form to use. It may also be kept in small bottles. The brush must also be clean. A brush that has been used to clean an infected hand is posi-

tively dangerous. Pus germs may live for days or weeks in its fibers. It is easily seen how these may be rubbed into the fingers and cause a serious contamination. Unless the brush is known to be clean it should be boiled before using. In scrubbing the hands it is important to separate and wash carefully between the fingers. The region of the nails is much the most dangerous, and about nine-tenths of the whole time consumed in cleaning the hands should be spent in cleaning around the nails. During the washing the water should be frequently changed. It is better to use running water. If a bowl of water is used the water should be renewed at least three or four times. The dirt removed at the first washing remains in the water, and would easily cause a renewed contamination of a clean hand.

Next comes the cleaning of the nails with a clean nail file. A nail file that has been contaminated by use on a contaminated hand would be one of the most dangerous things to use. A suspected file can always be cleaned by boiling thoroughly. From three to five minutes at least are required to clean the nails. The best way to determine whether the nails are clean or not is to look at them in a good light with a conscientious eye. If any particles of dirt, no matter how minute, are seen around the nail, or on the ridge at the side of the nail, one may be certain that the cleaning is not complete. If particles of dirt large enough to be seen are present, we may be sure that bacteria which are microscopical are not removed.

After the use of the nail file the hands should be scrubbed again with soap and hot water for from two to five minutes, to remove all matter loosened by the file. These steps in the disinfection have consumed from fifteen to twenty minutes.

The hands and arms should now be dried with a clean towel and then scrubbed with 70 per cent to 80 per cent alcohol for from three to five minutes. The alcohol can be used in a small clean bowl like an eating bowl or a finger bowl. As said before, the nails are, of course, the parts of the hand that receive the most attention.

Now comes the chemical disinfection. We may use a

sublimate solution of a strength of 1 to 500 to 1 to 2000, or carbolic acid 2 to 3 per cent, or lysol 2 per cent. Such a solution is contained in an earthenware or enamelware bowl. The hands and arms are thoroughly scrubbed in this solution for from three to five minutes.

The entire disinfection by this process requires from twenty to thirty minutes. After the hands are once thoroughly cleaned the later sterilization requires much less time. If the hands have been badly contaminated, for example, in dressing a case of erysipelas or caring for a person with puerperal fever the disinfection will take much longer. It is impossible to disinfect the hands at one time in such a case. Here it is necessary to repeat the process three or four times at intervals of two or three hours.

If there are on the hands or arms inflamed sores, no matter how small, they must after the disinfection be covered with iodine. Any pustules, no matter how small, must be evacuated, cleaned thoroughly with alcohol or iodine, and then sealed with collodion. If such a collodion dressing cannot be kept on the hand, or if there is any doubt as to its furnishing a sufficient protection, the hand should be protected by rubber gloves. If a nurse has any such sores on the hands she should call the attention of the physician to them and ask his advice as to their proper care. In this way only can she feel that she is doing her duty and also protect herself against the possible serious charge of infecting the patient.

Preparation of Patient.—*Begin during Pregnancy.*—The preparation of the patient may well begin a week or more before her expected confinement. A thorough, daily bath to keep the skin in good condition, laxatives and injections, if necessary, to empty out the large bowel, make not only the labor itself safer but also the child-bed more normal. The patient's hair should also be washed. If the nurse is in attendance before the confinement she will supervise this preparatory treatment.

Enema.—When real labor first begins the nurse should give the patient an enema and then a bath. The enema should under no circumstances be omitted unless the labor

is too far advanced. Often the patient will assure the nurse that her bowel is empty, that she has had three or four passages. The enema must be given to wash out the rectum, which still retains some fecal matter in spite of the bowel movements. If the head is down on the perineum of course it will be impossible to introduce much water into the rectum, and there will be no time for the enema, which must therefore be omitted.

Use of Closet.—Shall the patient use the water-closet after taking the injection and during the progress of labor? There are two or three objections to the use of the water-closet. The closet seat is not clean and the patient's skin becomes contaminated; after the cleaning of the patient, therefore, she should not sit on the closet. If she should by chance use the closet she should be thoroughly washed before getting back into her prepared, sterile bed. Foul gases frequently come from the closet basin. These may result from poor plumbing, which allow the sewer gases to ascend. They may also be due to the fact that the basin is not thoroughly clean. It is indeed a very difficult matter to thoroughly clean both the basin and its outlet down to the trap. When a woman sits on a closet these gases ascend and contaminate not only the external genitals but also perhaps the vagina itself. Later in the labor there is also the danger of the expulsion of the child during the act of defecation. A woman frequently mistakes the straining caused by the descending child for a call to stool. If she goes to the closet it is possible that the child may be expelled and even fall into the closet basin. Such accidents have more than once occurred. For these reasons it is safer for a patient to use the chamber-pot. If a patient uses the closet after the first enema the nurse should see that the seat is thoroughly cleaned. Later in the labor she would better always make use of the pot or the bed-pan.

Bath.—After the enema a thorough cleansing bath should be given. If time permits and the facilities are at hand a tub bath or a shower bath should be used. Otherwise a sponge bath is given. The objection to the tub bath is that the water becomes contaminated with the dirt from

the body. The water comes in contact with the vulva or may enter the vagina. The danger, especially with clean patients, is slight. Nevertheless, a shower bath or a spray is equally cleansing and does not subject the patient to that risk.

After the bath the patient is dressed in clean clothes, lies on her bed protected by a clean sheet, or sits in a chair while her hair is cared for. It is to be combed, braided, and securely tied so that it cannot come undone during the labor.

Dress.—The dressing of the patient during her labor must now receive our attention. If she is to remain in bed all of the time a short gown or shirt is sufficient. A clean undershirt with sleeves answers every purpose and is perhaps better than a cotton or linen garment. A long night-dress may also be used, but it is more in the way and becomes soiled by discharges, and needs to be changed several times during a labor of ten to fifteen hours. A long night-gown may be worn if an obstetric gown has not been prepared. Clean stockings may be worn if the feet are cold or if for any other reason they are desired. If it is not necessary for the patient to remain in bed during the whole labor a long night-gown should be put on over the short obstetrical gown and over this the ordinary dressing-gown. When the patient returns to her bed both the dressing-gown and the long night-gown should be removed. It is hardly proper for the patient to be around the room in the gown which she wears to bed. She contaminates her gown and then her bed. Unless her dressing-gown is freshly washed it is hardly proper for her to wear it over the dress she wears in bed. A very good plan is for a woman to have a perfectly clean bath robe to wear during labor when she gets out of bed. Before she steps on the floor the nurse should put on her stockings, which are to be removed when she returns to her bed. By this way the contamination of the bed by the clothing, which so often occurs, will not happen.

Bed.—The bed itself next requires the nurse's attention. A single or three-quarter bed is more convenient than a wide double bed. If possible it should always stand so

that it may be approached from both sides. If the mattress of the bed is lower than the side pieces, which happens especially in folding beds, it must be raised to the level of or above the sides by putting under it blankets or boards. Feather beds, which are once in a while found, must be removed. The mattress should be covered with a rubber sheet. In the outfit already given you will notice that a rubber sheet 3 yards x $1\frac{1}{2}$ yards is provided. This is cut in two so as to make two pieces, one, $1\frac{3}{4}$ x $1\frac{1}{2}$ yards and the other $1\frac{1}{4}$ by $1\frac{1}{2}$ yards. The larger sheet is placed over the



FIG. 61.—Labor-bed, with first rubber sheet and draw-sheet. After labor this becomes the puerperal bed.

mattress on the side on which we expect to work, generally the right side of the bed. It will cover the mattress except about 1 foot at the upper and 1 foot at the lower end, and is drawn over so as to cover the edge. Over this protecting rubber cloth is a draw-sheet folded so as to be about 4 feet wide and then another sheet covering the bed. Over this is laid the smaller rubber sheet, which becomes the rubber draw-sheet. This sheet extends 8 to 10 inches over the edge of the bed. Over this rubber draw-sheet is placed another sheet folded so as to be about $3\frac{1}{2}$ feet wide. On

this last sheet the patient lies, unless pads have been especially prepared. The patient is covered with a clean sheet and with one or more clean blankets if necessary. The pillows are of course provided with clean pillow slips.

Rubber Draw-sheet.—The second rubber sheet, that is, the rubber draw-sheet, enables us to protect the bed so that a change after labor is ordinarily unnecessary. By removing it with the pads and sheets over it a dry bed is left for the patient without further manipulation. The rubber draw-sheet is also of great value if we have to give the patient a



FIG. 62.—Labor bed complete, with rubber and cotton draw-sheets.

douche. To give a douche, for example in a case of post-partum hemorrhage, the patient is pulled to the very edge of the bed (Fig. 76), so far that the outer hip is partly over the edge, the pads and draw-sheets covering the rubber draw-sheet are removed, the rubber draw-sheet is pulled over far enough so that its lower end leads into a pail or slop jar placed at the edge of the bed, and its edges are turned in so as to form a trough which will conduct the water into the pail. In this way a large douche of gallons if necessary may be used without wearying or even disturbing the patient. In case of any operation where it is neces-

sary to turn the patient across the bed the draw-sheet is arranged in the same way. This use of the draw-sheet for the giving of douches is preferable to the use of a drainage pad like the Kelly pad. The latter cannot be cleaned easily and it is certainly risky to carry it from one patient to another. The rubber sheet is so cheap that a patient always has a new one for use in each case. If a patient is too poor to get a rubber sheet, a piece of white oil-cloth as recommended in the cheap outfit will answer very well the same purpose.

Bedsheets.—Ordinarily clean sheets for the bed and for pads answer all requirements. Old cotton sheets will do quite as well as expensive linen sheets. They should be carefully washed in clean water, dried, ironed, and put away together not to be disturbed until they are used. While such sheets are not absolutely sterile they are perfectly safe. Even if sterile sheets are used they will remain sterile on the bed but a moment. The important thing is that the sheets shall be well washed and boiled in clean water, ironed by one who has clean hands, and then put away where they will not be handled by anyone who has dirty hands. There is no objection to sterilizing the sheets if the patient or nurse have access to a sterilizer.

Pads.—If obstetrical pads are desired they should be made of sterilized cotton and sterilized or antiseptic gauze. The cotton is enclosed between a double layer of gauze and quilted so as to hold it in position, using clean or sterilized thread for this purpose. They should be about 1 yard square and may be sterilized after they are made. Pads made of common cotton and cloth are not as good or as safe as plain sheets unless thoroughly sterilized.

Disinfection of the Genitalia.—After the nurse has given her patient an enema and bath and prepared the obstetrical bed she proceeds to disinfest the genital region. The difficulties in the way of a thorough disinfection of the skin which have been described in speaking of the disinfection of the hands are considerably greater here. The creases and folds in the skin about the vaginal and anal openings and in the thigh and groin flexures together with the growth

of hair make the region very hard to clean. At the same time it is badly contaminated because of the glandular and vaginal secretions and the fecal contaminations. The sensitiveness of the skin and vulvar structures prevents the thorough mechanical cleaning that is possible with the hands. On account of these difficulties it is impossible to completely disinfect or sterilize the genital region at one attempt. Repeated efforts during the course of the labor will perhaps succeed. The best that the nurse can hope to do at first is to remove the greater number of the contaminating germs and render the remainder innocuous by the use of disinfectants. In this way the patient may be prepared so that it will be possible for an internal or a vaginal examination to be made without serious risk of carrying infectious matter into the interior of the obstetric canal.

Shaving.—Considerable of the difficulty in the disinfection will be avoided if the patient be shaved. In the preparation for a gynecological operation this is always done. Many patients, however, object to the shaving, and as some physicians consider it not absolutely necessary they omit it in simple cases. Whenever any kind of an obstetrical operation has to be performed, or when the labor is unusually prolonged and the chances for infection thereby increased, the hair should always be removed.

To clean the genital region a large amount of soap and water, as well as a disinfecting solution, must be used. To do this without soiling the bed, the patient must lie upon her back, having under her a suitable receptacle for receiving the water. The proper way to proceed will now be described.

Method of Cleaning the External Genitals.—Gather up a sheet in the middle so that it makes a V; with this cover the patient's legs and thighs with the middle of the sheet over the lower abdomen, leaving the genitals exposed. If more convenient two sheets may be used, one for each limb, or the sheet which covers the patient may be left over the left limb and a large towel may be used to cover the right. Slip under the patient, lying on her back, the thighs flexed, a douche or a bed-pan. Take a basin of warm water with a few pieces of absorbent cotton or sterilized

gauze for sponges and a cake or tube of soap. Wash the perineal region thoroughly with soap and water, including the inside of the thighs. Wash separately the anal region, being careful not to rub from the anus toward the vulva. Use plenty of water and do not separate the labia majora to wash their inner surfaces and the outlet of the vagina until after the outer region has been thoroughly cleansed. Always get a fresh basin of water before washing inside. It is best to use plenty of sponges and not dip the sponge that has been used in rubbing the skin into the basin. When the patient is not shaved the hair, particularly if long and thick, should be cut with the scissors. A satisfactory washing of the vulva with soap and water will take at least ten minutes. Then a basin of disinfecting solution containing sponges is substituted for the basin of soap and water. A strong sublimate solution of 1 to 500 to 1 to 1000 is perhaps the most efficient and best to use. A 2 per cent solution of carbolic acid or a 1 per cent lysol solution may also be used. With this solution the cleaning is done in the same order as before, that is, the anal region, the inner surface of the thighs, the outer surface of the labia majora are first washed, then the large lips are separated and their inner surfaces with the opening of the vagina are thoroughly covered with the disinfecting fluid. The inner structures are not rubbed so much as the outer but plenty of the solution is allowed to flow over them, being squeezed out of the saturated sponges.

The irrigator or douche may be employed in the washing. The water from the tube is allowed to flow over the genital region, which is in the meantime scrubbed with the cotton sponges.

Vaginal Douches.—The vaginal douche should not be given unless it is specially ordered by the physician. While some obstetricians use the preparatory douche in all cases of labor, its use is generally confined to those cases where there is some vaginal infection. If the douche is given it follows a thorough disinfection of the external genitals as just described. The physician will direct what solution is to be used.

Vulvar Pad.—After the disinfection of the genitals an antiseptic pad is sometimes placed against the vulva, especially after the rupture of the membranes, to absorb the escaping liquor amnii. If such a napkin is used it should be changed frequently. Under no circumstances should a napkin be allowed to remain too long, for it is likely to become saturated and dam back into the vagina the discharge, producing a condition that is favorable for its contamination.

Douche-pan.—The douche-pan and bed-pan should be handled with some care. A nurse who had prepared a bed with sterile sheets has been known to take a douche-pan from the floor under the bed and put it on the sterilized bed under the patient. A floor, especially a carpeted floor, is, of course, thoroughly contaminated, and a douche-pan thus used will contaminate the bed. Before it is used it should be thoroughly cleaned either by boiling it or washing it well with soap and water or some disinfecting solution. After use it should be emptied and then placed on a table or stand that is covered with a clean sheet or towel.

Solutions.—The nurse may now prepare the solutions and sponges that will be needed in the further conduct of the labor. A stand large enough to hold two or three bowls and pitchers should be placed near the foot of the bed, covered with a clean sheet. On this stand or table is placed a basin with a disinfecting solution, sublimate 1 to 1000 or lysol 2 per cent for washing the hands and another bowl for the solution with the sponges. If there is not a stationary washstand convenient another bowl with hot water and brush and soap for the preliminary washing of the hands is necessary. The sponges consist of pieces of absorbent cotton the size of the hand or similar pieces of sterile gauze. A small bowl like a finger bowl or eating bowl for alcohol is also needed. A pitcher for hot water and one for cold water is provided. Unless the hydrant water is known to be bad it will answer very well for washing the hands and external genitals. The nurse should have provided, however, a gallon or two of cold, boiled water for eventual use in the giving of salt solution injections under the skin or in giving

of douches. The nurse must always see that there is an unlimited amount of water at hand. It may happen that after labor a severe hemorrhage occurs. To control this a continual douche of hot water may be required for half an hour. Any delay in securing this douche may be fatal; hence provision must be made for a continual supply.

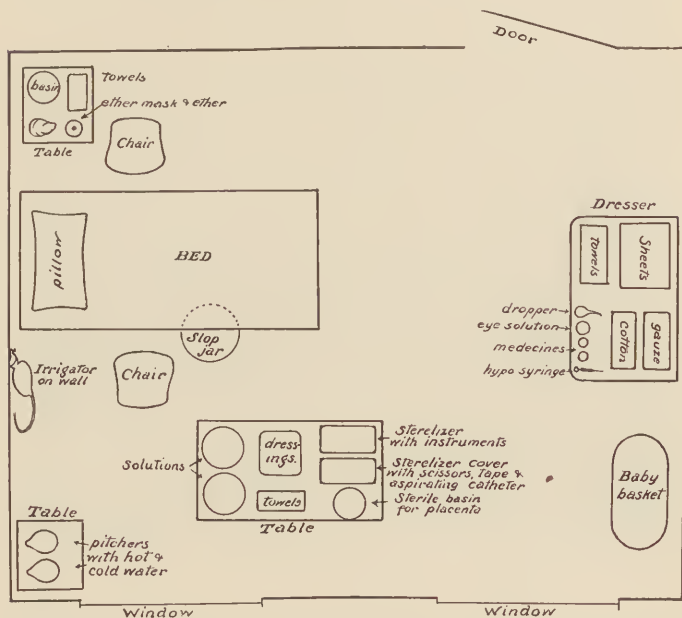


FIG. 63.—Arrangement of bed, tables, etc., for a labor-room in a private house.

Protection of the Floor.—The nurse should next take a large piece of oil-cloth, 2 to 3 yards square, that has been provided for the floor, and place it under and at the side of the bed. This is especially necessary if there is a carpet on the floor. A slop jar or pail for the soiled sponges, etc., should not be forgotten.

Douche Bag.—The nurse may next prepare the douche bag. If a new bag has been provided it will only be necessary

to boil it for two or three minutes. If we have to use an old bag that has perhaps become black from use and age it must be first thoroughly scrubbed in soap and water. The tube in particular must be thoroughly washed. Then the bag is placed in a kettle to boil for ten minutes. A cord or hook is also provided so that the bag can be fastened either on the head of the bed or in some convenient place. It is then wrapped in a clean towel and laid away until needed.



FIG. 64.—Arrangement of bed, instrument table, solutions, and douches in labor-room.

The douche tube, scissors, the tape, or other ligature for the infant's navel are next boiled and laid away in sterile gauze or towel. In the outfit previously recommended (page 126) sterile ligature is provided. The catheter that may be needed for drawing mucus from the baby's mouth is also cleaned and laid at hand.

The nurse may next utilize the time that she does not need to devote to the patient in preparing napkins for future use. They are made in the following way: A piece of gauze about 30 inches long is cut from the roll and spread out on a clean towel. On this is placed a strip of cotton about

15 inches long and 5 inches wide and of the thickness of a cotton layer. This is enclosed in the gauze and is ready for use. Eight or 10 of these napkins may be made and folded up in a sterile towel ready for use.

After the nurse has prepared the blankets and the bed for the reception of the baby she is now able to give her entire attention to the patient.

Examination of Patient.—In the absence of the physician, when the nurse is alone with her patient, she must keep track of the condition of the patient and the fetus and the progress of labor. The general rules for examining a patient that apply in all other cases hold here. The rate and character of the pulse should be taken frequently and recorded. The temperature also is important. The amount of food and drink taken should be noted. If the patient vomits, which is not infrequently the case, this fact should also be recorded, as well as the action of the bowels and the bladder. Any headache or dizziness should be inquired into. The frequency and duration of the pains should be accurately studied and reported.

The position and presentation of the child and its location or, in other words, the progress of labor are determined by both external and internal examinations. Internal, including rectal and vaginal examinations, are rarely necessary and should never be made unless ordered by the attending physician. The external examination comprises both the abdominal examination and the external examination of the genital region.

Abdominal Examination.—*Inspection.*—The abdominal examination is made by inspection or sight, by palpation or touch, and by auscultation or hearing. On uncovering the skin we see the general size and shape of the abdomen as well as the movements due to the child. The uterine tumor fills a considerable part of the abdominal cavity extending from the pelvis to the chest. When the child lies in the normal position and posture the long axis of the tumor is lengthwise with the body. As a rule the uterus does not lie directly upon the spinal column but is more to one side. In the majority of cases it lies more to the right side. In a cross

presentation the shape of the uterine tumor is different. It is broader and not so long; hence a cross presentation can be determined generally by inspection. When looking at the uterus we frequently see the movements caused by the motions of the fetus. These, of course, show that the fetus is alive.

Palpation.—By palpation we determine the presentation and location of the child as well as the question of the fulness of the bladder and the condition of the uterus. All these questions can be determined much better by the external examination than by the vaginal examination. It is rarely absolutely necessary that an internal examination be made in labor especially if the attendant can remain with the patient.

In making the abdominal palpation a routine should be followed so that the fewest possible manipulations need be made. With a little practice a nurse may determine with two or three manipulations within half a minute and with almost absolute certainty how and where the baby lies.

First Manipulation.—In the first manipulation the nurse, standing on the right side of the patient and facing her head, places the hands, one on each side of the upper part of the abdomen so as to grasp the fundus of the uterus through the abdominal walls. The fingers are extended and the whole hand lies firmly but lightly on the body. Now by moving the hands back and forth, changing their position but little on the skin, the part of the fetus that lies in the fundus will be moved from side to side and be thus felt. We have to determine whether this part be the head or the breech. It is generally possible to distinguish the head by its size, hardness, and shape. If the uterus contracts during this manipulation the findings are indefinite and we must wait, keeping the hands on the abdomen, until the contraction passes away. Sometimes, however, even when the uterus is relaxed, the breech of the child feels so large and hard that we are in doubt and must wait for the second manipulation to clear up the question.

While making the examination of the fundus we often feel the small parts of the child. A foot, or leg, or knee, or some-

times a hand, is often violently forced against the abdominal wall and the examining hand. Sometimes we may grasp this small part of the child and make out quite clearly what it is.

Second Manipulation.—In making the second manipulation the nurse turns around, facing the patient's feet and grasps the lower segment of the uterus through the fundus. The hands are kept well to the sides of the lower abdomen, the little finger and ring finger being pressed well down into the groin. Firm pressure must be made, but very gently, so that the patient does not feel pain and resist. The chief



FIG. 65.—Palpation of the abdomen to locate the presenting part. Second manipulation.

work is done with the outer border of the hand and the ring and middle finger. The head, if presenting, is felt as a hard mass, which by patience can be outlined, and if it be not engaged in the pelvis can be moved from side to side. If the examination causes any contraction of the uterus we must again wait until the contraction passes away.

By this manipulation we determine not only the location of the head in the lower segment of the uterus but also the position of the head. In the normal flexed posture of the child the line of the back is almost continuous with the back of the head, while the forehead forms a prominence or pro-

jection. In other words, the forehead projects a great deal more than the back of the head. Remembering this fact we have a means of determining the position of the child. While making the second manipulation we feel a much greater prominence with one hand than the other. This prominence denotes the child's forehead, consequently the back of the head lies to the other side. By this second manipulation we also locate the head or determine the extent of its progress through the obstetrical canal. If we feel the entire head movable above the pelvis it of course has not begun to enter the pelvis. When the head has nearly engaged in the pelvis,

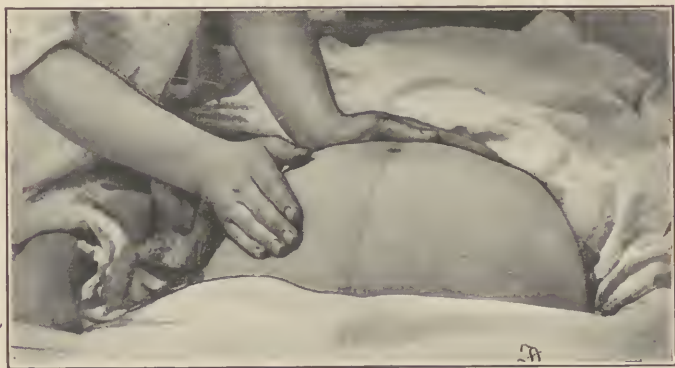


FIG. 66.—Palpation of the abdomen to locate the back. Third manipulation.

we feel the back of the head not at all or with some difficulty, while the forehead is still easily made out. When the head has entirely entered the pelvis and we cannot reach it by the external manipulation, the hands then feel only the shoulders and the trunk.

Third Manipulation.—By the third manipulation we complete our examination of the position of the child by determining the position of the back. Turning so as to face the patient the nurse places one hand on the fundus over the breech of the child and presses down somewhat firmly in the direction of the axis of the uterus. In this way by pressing the breech toward the head she increases the curve or con-

vexity of the back and makes it more prominent. Then she places the right hand first on one side of the abdomen and then on the other and outlines with it the position of the back. Often she can feel quite distinctly the curve of the back against the abdominal wall. When this is not possible, she at least experiences greater resistance on one side than on the other. This greater resistance denotes the back.

It is evident that the child may lie exactly on its side, when the back will be directly to the side of the mother, or its back may be directed more toward the front or abdominal wall or toward the back of the mother. When the back of the child lies against the front wall it is more easily made out by this third manipulation than when it is turned toward the back of the mother. In the latter case the small parts of the child, that is, the hands, elbows, arms, and lower extremities, are more easily felt.

Importance of Determining Fetal Heart Tones.—The fetal heart sounds are generally best transmitted through the back of the child and the corresponding portion of the uterine and abdominal walls. Consequently when the back of the fetus is turned toward the front of the mother's abdomen the heart tones are heard at their best. Their distinctness also depends upon the amount of liquor amnii and the amount of fat in the abdominal wall. In a head presentation they are generally heard best below the level of the umbilicus, while in a breech presentation they are best heard above this level. When the back of the child is turned to the left side they are heard to the left of the middle line, and when the back is to the right they are heard on the right side. Consequently the location of the area of the fetal heart tones helps us in determining the position of the fetus. In rare cases when we are unable to feel the back with certainty the finding of the heart tones on one side or the other will help us to a decision.

The counting and the observation of the fetal heart tones is the duty of the nurse. Almost our only way to study the condition of the child is through the study of the rapidity and character of the fetal heart beats; hence it is necessary for a nurse who is often responsible for a patient for hours

at a time in the absence of the physician to be perfectly able to examine the fetal heart. She has two patients under her care and she is just as responsible for the unborn child as for the mother. If during the absence of the physician the mother should die and upon the physician's return the nurse should be ignorant of the fact, she could hardly excuse herself to the physician or to the family. She should keep just as close watch upon the unborn child as upon the mother. Frequent examinations of the fetal heart, especially in a long and severe labor, must be made, and if she finds any change



FIG. 67.—Auscultation. Counting fetal heart tones with phonendoscope.

she must report this to the physician just as she would any unfavorable change in her other patient, the mother.

Auscultation.—The fetal heart tones may be heard by listening with a stethoscope or phonendoscope or by applying the ear directly to the skin. The best way is with the phonendoscope. This instrument should be a part of the nurse's outfit and she should thoroughly understand its use. It should lie securely on the abdomen by its own weight and not be held or pressed against the skin. The way of finding the exact location of the heart tones is the same as in direct

auscultation which, as it involves a more difficult technic, will be described in some detail.

After palpation, as described above, the nurse covers the patient with a sheet and kneeling by the side of the bed, corresponding to the supposed location of the back of the child, she applies her ear to the skin protected by the sheet. She should first listen at a point half-way between the navel and the symphysis pubis. Then if the heart tones are not distinctly heard at this point she should carry the listening gradually to the side and then up and down until the whole



FIG. 68.—Auscultation. Counting fetal heart tones with ear applied to abdomen.

lower quarter of the abdomen has been examined. In case she does not hear the heart at all she should then pass to the other side of the patient and examine the other section of the lower quarter the same way, suspecting she has made a mistake in the examination with her hands. If she still fails to find the heart tones she may examine the upper half of the abdomen in the same way. Still failing, she may apply her ear directly to the skin, for the sheet sometimes disturbs the hearing. If she is still unsuccessful she should place her hand over the fundus of the uterus as in the third manipulation

in palpation and press upon the breech of the child so as to increase the curve of its back and bring it nearer the abdominal wall. Then she may be able to hear the sounds which were before obscured by the fruit water that separated the child from the wall of the uterus. Sometimes the sounds are brought out more prominently by having the mother turn on one side or another, generally turning so that the back of the child is uppermost. These examinations during labor should be made in the intervals between the pains, for the contractions of the uterus very frequently obscure the fetal heart tones so that they cannot be heard. Examining this way a nurse who is accustomed to listening to the fetal heart will almost always find it if the child be living. Its absence, therefore, together with all absence of fetal motion as felt by the nurse or mother, would create a strong suspicion that the child was dead.

Counting Fetal Heart Tones.—In counting the fetal heart beats it is well for the nurse to count for fifteen seconds, then begin again and count for fifteen seconds more, repeating the counting this way for the minute and make a record of her findings by quarter minutes instead of by minutes. For example, she counts for the first quarter 33, for the second 35, for the third 34, and for the fourth 37, this would be recorded, 33, 35, 34, and 37. From this record one not only sees the total for one minute 139, but also the irregularity in the fetal heart.

At the beginning of labor the nurse will be informed by the physician where the fetal heart may be found or she will discover this for herself. Then she should count the sounds several times at intervals of about every half-hour in order to discover what is the normal heart beat of this child. Then she is in possession of the facts that enable her to judge of the irregularity and changes in rate at a later stage of a severe labor.

Rapid and Slow Fetal Heart Beats.—Very rapid and very slow heart beats show that the child is in danger. If the normal heart beat of the fetus is 130, a rate of 180 shows considerable disturbance in the child's circulation. For a child whose normal rate was 155 or 160 a rate of 180 would

not be so important. A rate of 100 or less is also generally a sign of danger.

Irregularity in the Fetal Heart Beats.—A great variation in the heart beat is also to be observed with care. If the count should be 33, 36, 40 or 30, 35, 25, 22 we would feel some anxiety for the child and realize that it must be watched with great care. Uterine contractions frequently cause some irregularity in the fetal heart even in the early stages of labor. At a later stage these irregularities are more pronounced and if not too great may not be of so much importance. Irregularities that are noticed in the interval between the pains are probably of greater moment. Under any circumstances they call for unusually careful observation and, of course, record.

Much less importance is to be attributed to the clearness with which the fetal sounds are heard. As has been stated this depends very much upon the position of the child. Since the position may change during the labor the sounds will vary in distinctness. After the membranes break and the fruit water escapes the sounds are generally heard more distinctly. If, however, the nurse has kept a careful watch of the sounds in the latter part of labor after the waters have escaped, and has a good basis for judgment as to the clearness of the sounds, then a marked change in their character, consisting of great diminution in clearness and distinctness, will be a good reason for thinking the child is in danger.

Inspection of the Genital Region.—The external examination of the genital region consists of inspection and palpation. By inspection we recognize the distention or protrusion of the perineum during a pain which indicates that the head begins to escape from the bony pelvis and press upon the perineum. As the head advances farther the vulvar lips begin to separate. Shortly after this the advancing part of the head is seen. All of these stages can be observed by the nurse and of course necessitate the more or less urgent call for the physician if he be absent.

By inspection one also notices the character of the discharge from the vagina. When the membranes rupture the liquor amnii begins to escape and it continues to flow,

as a rule, during the rest of the labor. It occasionally happens in a protracted labor that the fruit water becomes discolored. It has a dirty blackish color, due to the presence of meconium. This generally indicates that the brain centers have been injured by pressure or asphyxia resulting in paralysis of the sphincter ani. The presence of the meconium in the liquor amnii in a head presentation is therefore an important symptom, and should be noted and reported to the physician at once.

Blood may be found in the vaginal discharge at almost any time during the course of labor. In the latter part of the first stage of labor it generally denotes a spontaneous tear in the cervix. This we have called the "second show," page 108, just as the slight bleeding which accompanies the beginning of the separation of the membranes from the internal os and the expulsion of the mucous plug from the cervix constitutes the "first show," page 106. In rare instances bleeding is due to an abnormal location of the placenta or to other serious complications which have already been discussed (see pages 88 and 93). In the second stage of labor the blood may come from a tear in the vagina. Rarely a severe hemorrhage occurs from rupture of varicose veins in the vagina. The hemorrhage should always be noted by the nurse when she is in charge of a case.

Palpation of the Perineal Region.—Besides inspection, however, the nurse has another means of determining the progress of labor and one that may be employed before the bulging of the perineum begins. This is palpation of the advancing part of the head through the skin just below the anus. It may be practised with the patient on her side or on her back. Protecting herself with a gauze sponge, with the tips of the fingers resting on the skin between the sacrum and the anus, the nurse presses inward during the pain and thus can easily determine if the head be approaching the outlet of the bony pelvis. This manipulation is quite valuable, for it enables one to judge concerning the progress of labor after the head has completely disappeared from the abdomen and can no longer be felt from above. During this stage

of labor the nurse, who is forbidden to make an internal examination, is often uneasy in regard to the advance of the head.

Internal Examinations.—While the presentation, position and station of the child can be determined generally by external examination alone, it sometimes happens, especially in cases of dystocia, that the results of the external examination are unsatisfactory. Moreover, the causes of the lack of progress of labor are occasionally obscure and can be deter-



FIG. 69.—Palpation through the perineum.

mined only by internal examination. For example, the progress of dilatation of the cervix can be known surely only by such examination. In hospitals with resident physicians or interns in attendance, nurses are rarely or never called on to make any kind of internal examinations. In outside practice however, and sometimes in smaller hospitals that have no resident physicians, nurses may be asked to make such examinations, especially supervising nurses and those who make a specialty of obstetric nursing and who

sometimes take a state examination in midwifery. Hence it is necessary that the subject be discussed in this place.

Rectal Examination.—Internal examinations may be made through the rectum or through the vagina. The former is less dangerous to the patient and fairly satisfactory and therefore much more likely to be asked of the nurse. The things to be determined by such an examination are the kind of presentation, head or breach, the amount of descent of the presenting part, the presence or absence of any obstruction in the pelvis and the amount of dilatation of the cervix.

The technic is comparatively simple. The bowels and the bladder should be empty. The patient may lie either on her left side or on her back. The nurse, standing behind the patient or on her right side, with a rubber glove on her right hand, introduces the gloved forefinger, lubricated with petrolatum, into the rectum and explores the pelvic cavity. She can determine easily whether the presenting part is above or entering the pelvic inlet, or whether it is already in the pelvic cavity. It is more difficult to determine the condition of the cervix uteri but generally after feeling through the anterior rectal wall she can make out the cervix, the amount of opening of its external os and the presence or absence of the bag of waters. A prolapse of the cord she would be likely to detect and likewise any marked abnormalities in the pelvis.

Vaginal Examination.—The value of vaginal examinations in labor has been much over-rated both by physicians and midwives. Fortunately trained nurses generally have been taught that the making of internal examinations, especially vaginal examinations, is not one of their duties. Needless to say such examinations may be much more dangerous than rectal examinations by carrying infecting germs into the obstetric canal. During an examination the membranes might be ruptured prematurely, causing, perhaps, a serious disturbance to the progress of labor. They are, moreover, as a rule, quite unnecessary. A nurse in general practice might never be called upon during her whole life to make such an examination. Occasionally, however, a physician

expects this of a nurse, and it is for this reason, at least, that she should know the proper mode of proceeding and have in mind what she should find. The examining hand should be protected with a rubber glove. A thorough disinfection of both hands should, nevertheless, be made. The front and middle finger of the right hand are generally employed. After the patient has been thoroughly washed



FIG. 70.—Method of making an internal examination. The nurse separates the labia and is about to introduce the examining fingers.

and disinfected as well as possible, as has been previously described, the nurse, holding apart the labia so that the examining fingers may not come in contact with any outside contamination introduces the fingers into the vagina. If lysol is used as a disinfectant there is no need of a lubricant. If the vagina seems somewhat dry or the vaginal outlet is rather small, a lubricant may be desired. Great care must be used in selecting something which is not in itself con-

taminating. Ordinary vaseline, for example, in a half-filled box, which perhaps has been lying around the house for some time and into which many dirty fingers have been dipped, will doubtless be a source of danger. A boiled oil would answer the purpose. The tube of antiseptic soap or liquid soap which is recommended in the outfit is very well adapted for this purpose, as it is clean and convenient to use. Glycerin may also be employed.

The object of the internal examination is to determine the condition of the vagina, the possible presence of any growths in or deformities of the pelvis, the condition of the cervix, including its thickness and the amount of its dilatation and the location, position, and condition of the presenting part of the fetus. These objects should be kept in mind and the examination conducted with a certain routine so that as much as possible may be learned in as short a time as possible. The element of time is of great importance in making a vaginal examination because there is more danger from abrasions and dislodged germs in an examination of five to ten minutes than from one of a half a minute.

The nurse will, therefore, proceed with her examination, sweeping the fingers around the vagina and noting its smoothness or roughness, the amount of secretion, and the presence of any abnormality. During this process she will also notice the presence of any growths obstructing the pelvis as well as the shape of its walls. In particular she should notice the shape of the sacrum, whether it has the proper curve or not and the forward projecting coccyx. She should next feel for the cervix. You will remember that the uterine contractions first cause the obliteration of the vaginal portion of the cervix and then gradually open the cervix until the uterus and the vagina form a continuous canal. Sometimes the obliteration of the cervix has taken place before the real labor begins, having been produced by the preparatory pains. By the examining fingers we first find whether this vaginal portion still exists or not. If it is obliterated we next determine whether the cervix is open, and if so how much. The degree of opening of the cervix is expressed by estimating how many fingers it will

admit, or after it is half dilated by indicating the width of the rim that remains. We say, for example, that the cervix will admit one finger or two fingers, or that a rim of one or two fingers' breadth still remains. Sometimes the cervix is thin, its border feeling not much thicker than a sheet of paper; at other times it is thick and feels, perhaps, somewhat like a swollen lip.

In making the examination of the cervix, we also determine whether the membranes are ruptured or not. If they are intact and the cervix is open one will feel the bag projecting into the cervix more or less, especially during a pain. If it has been ruptured, the finger will come into contact with the head or presenting part without any intervening membrane or tissue. If the membranes are intact the examination must be made very carefully so as not to rupture them. About all the nurse will be expected to do will be to recognize the presenting part, whether it be a head or face, the breech, the hand or foot, and determine whether it is in the inlet, excavation, or the outlet. If the cord be prolapsed the condition should be recognized, for it is a very important one and calls for immediate treatment.

Care of the Bladder during Labor.—It occasionally happens that a patient cannot urinate voluntarily during labor. This ischuria may be due to the pressure of the child against the urethra. The bladder may be injured by distention. Moreover, such distentions often interfere with the abdominal contractions, which are important elements in the second stage of labor. It may, therefore, become necessary to draw urine from the bladder. The presence of any considerable amount of urine will be recognized at once by the nurse when she makes the abdominal examination. A distended bladder will easily be felt above the pubis, perhaps reaching half-way up to the navel. If the head is in the pelvis and the bladder entirely displaced into the abdomen it will be very easy for the nurse to exaggerate the amount of fluid it contains, as the bladder will form such a mass in the lower abdomen. When the head is in the pelvis six ounces of urine in the bladder will cause a considerable tumor.

Catheterization.—Under these circumstances drawing the urine with the glass catheter that is used in the puerperium and in other conditions is not desirable and often not possible. The catheter might not reach the urine, and there would be some danger of its breaking by the pressure of the child's head during the pain. For this purpose a fairly large soft rubber catheter is recommended. It should be used after a thorough washing of the patient as before described, and with the same precautions that are used in other cases and which will be more particularly considered when we come to speak of catheterizing in the puerperium.

Shall the Patient Remain in Bed?—In considering further the conditions of labor we must allude to the question that is frequently asked the nurse as to whether the patient can sit up or walk about or whether she would better remain in bed. Also, if in bed, in what position should she lie? After the membranes break the patient should remain in bed. By so doing she will lose less of the fruit water. Its retention, as much as possible, is of advantage both to her and to the baby; consequently in an early or premature rupture of the membranes the patient must remain in bed during the whole labor. Even when the rupture occurs two or three days before labor begins the same rule applies.

If the patient is weak she would better remain in bed. There is no particular advantage in having her sitting or walking about the room. The labor may progress a little faster, perhaps, but, on the other hand, she is apt to lose some rest that she might obtain in bed. However, if she feels better up, if there is no contraindication, she may be allowed to do as she pleases.

In bed a patient generally wishes to change her position occasionally. As a rule the pains are apt to be more vigorous when she lies on her back. If she wishes to lie on her side she is generally directed to lie on the side corresponding to the back of the child. This position favors the normal mechanism of labor.

Nourishment.—In a long labor lasting a day or more the question of nourishment becomes important. In a short labor it is often impossible for the patient to eat much

because of the disturbance of the stomach. Severe pains may act in one way or another to cause an evacuation of the stomach contents. In a long labor there are apt to be intervals where the pains are not so severe. These must be utilized to give the patient nourishment and stimulants. Sometimes milk with lime water and brandy is best borne. In such a case, however, the physician is always present and will, of course, assume the responsibility.

Moral Support.—An extremely important part of the nurse's duty is to furnish moral support to her patient, who suffers from both pain and fear. While the pain varies greatly in intensity and is no doubt often very acute and quite exceeds any other kind of pain to which people are ordinarily subjected, yet it is made much worse to bear by unnecessary fear. The patient fears that the pain will become greater and quite unbearable. She fears that she will become exhausted. She fears that all is not going well, that some operation will be necessary. Often she has vague and indefinite, but none the less real fears, that cannot be described. If these fears can be dispelled, if the patient could be made to believe that her pains will never be greater than she can bear, that she has nothing to fear, that she is only suffering as millions of women have suffered in the past and as hundreds are suffering every hour she will be relieved of an important element of her distress.

Analgesia and Anesthesia.—Many efforts have been made to discover a means by which pain may be done away with. Various drugs have been used as analgesics or pain annihilators. Morphine, chloral, and other drugs that have any effect may interfere with the uterine contractions or they so endanger the fetus that they cannot be used to such an extent as to relieve all pain. Nevertheless, when used in proper dosage and not less than four hours before the end of labor they are not harmful either to mother or fetus and are very valuable in painful and protracted labors. "Twilight sleep," of which one has heard much in recent years is a stuporous condition secured by repeated injections of morphine and scopolamine. It requires much care and the constant watchfulness of the physician. It is not

devoid of risk, and the responsibility for its management should not be imposed upon nor assumed by the nurse. The anesthetics, chloroform and ether, have been much used to alleviate suffering. The discoverer of the anesthetic properties of chloroform, the celebrated obstetrician Sir James Y. Simpson, hoped that he had found a means of rendering child-bearing painless. Our experience shows us that while anesthetics are very valuable in certain stages of labor, and while they may be used in the last part of labor so as to control the most severe pain due to the expulsion of the child, they cannot with safety be used during the whole course of confinement.

Ether or Chloroform?—To the nurse is frequently entrusted the duty of giving the anesthetic, and she should, therefore, take every opportunity to perfect herself in the technic of its administration. Both ether and chloroform are employed. While in this country, in general surgery, ether is more used than chloroform, in obstetrics, chloroform has been used almost exclusively until the last ten or fifteen years. Recently a good many obstetricians have begun to use ether in labor more extensively, and believe that it has the advantage over chloroform, that it does not as much interfere with the uterine contractions, that when the contractions are stopped by the anesthetic they begin sooner upon its withdrawal, and that it is safer and more pleasant to use. Especially at night, when there is a gas or lamp flame in the room, chloroform is decomposed and a very irritating gas is formed. Ether is inflammable if brought near the flame. If great care is used, however, in opening the can and keeping the ether some distance from the flame there need be no danger.

Administration of Ether.—Ether is given generally with some kind of a cone or it may be given on a mask like chloroform. About a dram is sprinkled over the cloth in the cone at a time. In the beginning of the administration it should be held an inch or two from the face so that the patient will not be frightened. The ether is generally given only during the pain. In this way the pain is diminished, but consciousness is not entirely obliterated. Since the nurse will use

the anesthetic only under the direction of the physician, she will, of course, be guided by him as to the amount employed and the degree of anesthesia produced.

Administration of Chloroform.—The method of giving chloroform differs from that often employed with ether in the fact that the former must always be well diluted with air and that it is given in very much smaller amounts: a few drops only at a time sprinkled over a cloth held over the patient's nose and mouth. The well-known mask may be used or a thin cloth, like a handkerchief, may be supported on the fingers. The back of the hand is laid over the face, the nose being between the middle and ring fingers and the handkerchief held by them from contact with the skin. In dropping chloroform from the bottle it is best to cut a groove in the cork through which the chloroform escapes in small drops.

Nitrous Oxide Gas.—Nitrous oxide gas is now used considerably in some hospitals in the second stage of labor. It is rather more agreeable to take than ether and when properly given, combined with oxygen, it is probably as safe for both mother and child. The technic of its administration is more difficult and can be learned only by training under a good teacher.

Support of the Back.—Mention has been made of the value of massage as a preparatory treatment during pregnancy. It diminishes abnormal sensibility and thus proves a great aid during labor. One measure by which the pain may be at times somewhat lightened, very old but none the less important, may be added. This is the support of the back. During certain stages of labor, under certain conditions, pain in the back is intense. Whether this pain be due to pressure on the large nerve trunks found in this region or to the stretching of the posterior joints or to some other causes, it is a fact that it sometimes may be relieved by firm pressure. This is best applied when the patient is on her back, by placing the hand under the sacrum with one finger just at the upper border of the hip bone and resting the arm on the bed as a support, raising up the back with the hand.

Pulling.—When the patient comes to the second or expulsive stage of labor she has an inclination to support the body in such a way as to obtain the most power from the abdominal muscles. This leads her to brace her feet so as to fasten the lower part of the trunk and also to immobilize her chest so as to make the best possible use not only of the muscles of the abdominal wall but also of the diaphragm. Pulling with the arms further than this is probably of little value, yet this action seems an unconscious accompaniment of the abdominal work. The patient may be encouraged



FIG. 71.—Support of the back during labor.

to immobilize herself by taking hold of the rounds at the head of the bed if her bed be of such construction; otherwise she may grasp the hands of her nurse, or perhaps it is just as well to grasp her hands together. It is quite unnecessary for the patient to pull herself all over the bed in her frantic efforts. Not only is the cleanliness of the bed thus destroyed, but the attendant is very much handicapped in his efforts to manage the labor.

Prevent Contamination of Genital Region.—As the head approaches the outlet its pressure behind forces out any

contents of the rectum. These will, of course, contaminate the bed and also probably the vulva and vagina. The nurse must at once collect upon the sponges that have been prepared for that purpose any particles that may be discharged from the anus.

Supporting the Perineum.—As the head is expelled from the vulva it becomes the nurse's duty to prevent the tearing of this opening. Since the tear is generally through the perineum this manipulation is called protecting or supporting the perineum. A mistaken idea concerning this manipulation is quite common. Many think it consists of pressing back the perineum by holding the hand against it. The importance of the subject is great, for tears lead often to subsequent disturbances which seriously affect the health and comfort of the patient. To understand properly the method of preventing tears we must for a moment study the way in which tears are produced.

Many tears are unavoidable. When the circumference of the child's head is greater than any opening that is permitted by the elasticity of the outlet a tear must result. Under the most favorable conditions, where labor is managed in the best possible manner, tears occur in about one-third of all primiparæ. In these cases all the attendant can do is to prevent the extension of the tear as much as possible.

Unnecessary tears are avoided by preventing a too hasty exit of the head, thus securing a gradual dilatation and by causing the head to make its exit in the most favorable position so that it passes through the vulva in its smallest circumference.

Prevent Rapid Expulsion.—When the uterine and abdominal forces are very powerful the head may be forced along so fast that the outlet has not time to enlarge normally and is torn. In such cases the head should be held back. In general the head should never be allowed to make its exit during a pain. With each pain the vulva is distended more and more until at the last, in the interval between the pains, the head is pressed out by the hand placed behind the anus, resting over the face against the perineum.

Keep the Head Flexed.—The head is in the most favorable position to pass through the vulva without lacerating



FIG. 72.—Head passing through vulva in the attitude of flexion. Compare the suboccipito-frontal diameter, which denotes the stretching of the vulva with the occipito-frontal diameter in Fig. 73.



FIG. 73.—Head extended in exit. Note that the occipito-frontal diameter here denotes the distention of the vulva instead of the shorter suboccipito-frontal diameter in Fig. 72.

it when it is flexed as much as possible. When in this position the largest circumference that passes through the vulva is the suboccipito-frontal. Unless the occiput is well through the vulva when the extension occurs a larger circumference, the occipito-frontal, will have to be accommodated. From this it follows that the nurse should strive to keep the head well flexed and be sure that the occiput has passed out of the vulva and the nape of the neck appears before extension is allowed to occur. With these two principles clearly in mind she will be able, after she has had some experience, to secure the best results.

Position of Patient during Delivery.—The patient may be delivered lying on the back or on the side. If she lie on the back the hips should be somewhat elevated by one or two extra pads. Under no circumstances should she be allowed to assume a posture where the hips are sunk into the bed. In such a position the attendant would have absolutely no control of the perineum. The best control at least with beginners is probably obtained with the patient lying upon the left side. With the patient in this position, her hips flexed, the attendant behind her, with the left arm between the thighs, is in a position to control the movements of the head; with the right hand she is able to press against the forehead of the child, thus securing proper flexion and at the same time, with a sponge, protecting against possible contamination from the anus.

When the patient lies on her back the attendant sits at the side of the bed facing her and places the right hand, protected by a sponge, over the anus so as to keep the head flexed and prevent its too rapid expulsion. With the left hand the back of the head is pulled forward, if necessary, until the occiput is well through the vulva.

Delivery of the Body.—As soon as the head is born the attendant examines to find if the cord be around the neck, removes it by pulling it over the head if that be the case, wipes the face of the child, supports the head without pulling on it (see Fig. 58), and waits for the expulsion of the body. This follows, in some instances, almost immediately, and generally with the next pain, within two or three minutes

after the birth of the head. Only rarely is any assistance required. When the nurse believes that the child is in danger on account of finding irregular heart tones, and there is several minutes' delay after the birth of the head, she may assist the delivery of the body by pressing on the uterus through the abdomen. During the birth of the shoulders and trunk there is renewed danger to the integrity of the vulvar outlet or perineum. Quite often a perineum that has remained intact during the careful passage of the head is torn because of a sudden exit of the shoulders. Sometimes also the elbow escapes shortly after the shoulder and makes a tear in the perineum. The circumference of the body and shoulders is almost always a little less than that of the head, and they should not produce a laceration. It is only necessary to observe the same rule that has been given for the delivery of the head. They must be brought through slowly, and if necessary in an interval between the pains. The same rule holds in the delivery of the elbow.

After the body is born the child is covered with a warm sterile blanket and allowed to lie between the thighs of the mother until the pulsation of the cord ceases, when the cord is tied and the child removed. The method of caring for the child and tying the cord will be described when we come to speak of the care of the infant.

Ligation of the Cord.—The cord is tied in two places, about 2 and 4 inches from the child, and cut between the ligatures. The ligature next to the child must be tied tightly to prevent hemorrhage. The chief object of the ligature on the placental side is to prevent the soiling of the bed with the blood which fills the vessels of the cord and the placenta. In case of a twin pregnancy there may be a connection between the circulation of the children, when the second ligature would be necessary to prevent the second child from bleeding to death.

It is convenient to place another ligature around the cord near the vulva and remove the outer piece of cord. Very slight traction is made in order to pull out any loops in the cord which may remain in the vagina. Then a tape is tied around the cord just at the vaginal outlet and the

outer portion cut off. The placental end will then retract within the vagina. The patient may now be cleaned and a vulvar dressing applied. When the placenta is expelled from the uterus and remains in the vagina the cord will be pushed out from the vulva and will thus indicate the location of the placenta.

Management of the Third Stage.—After the birth of the child begins the third stage of labor, the birth of the placenta, and to this we next give our undivided attention. The nurse, if she happens to be alone with her patient, should not leave her side. When the baby is separated it is quickly placed in its previously prepared bed and needs no further care. The mother should have constant attention on account of the possible danger of hemorrhage.

As soon as the child's body is born the nurse should lay her hand upon the abdomen and watch the uterine contractions. As a rule it is not necessary for her to rub the abdomen or make any particular manipulations. The pressure of the hand will, perhaps, cause a slight stimulation to the uterus. The chief object, however, is careful observation. The uterus will be felt during a contraction as a hard body, almost like a stone, extending perhaps two-thirds of the way to the navel. The hard contraction lasts perhaps a minute, when relaxation begins; it then becomes larger and softer. It should be possible, however, always to outline it. The period of relaxation varies also in length. These alternating relaxations and contractions continue until the placenta is expelled.

The placenta may be expelled by the first contraction after the expulsion of the child or it may not be expelled for several hours. If there is no urgency on account of hemorrhage or because of a serious condition of the patient the nurse need not be worried over the delay in the expulsion of the after-birth. She will quietly await the appearance of the physician, keeping, as said before, a close watch upon uterine contractions.

When the placenta appears at the vulva the nurse must endeavor to prevent the tearing of the membranes so that no part of them are retained in the uterus. For this reason

she holds the placenta in the hand or in a basin and gradually draws it away as the membranes peel off from the lower segment and pass through the cervix. Patience and avoidance of any unusual traction are all that are needed.

After the placenta is born it should be placed in a basin or other receptacle and examined to determine whether it is intact or whether a part has been left in the uterus. First the uterine surface is observed and the absence of any lobes noted. Then the membranes are arranged as carefully as possible in their natural position. The location of the tear through which the child escaped is noted and the completeness of the membranes determined. The placenta is then set to one side for the inspection of the physician.

With the placenta come, frequently, some clots of blood which have accumulated behind it and sometimes fresh blood. A contraction of the uterus which follows after the expulsion of the placenta should prevent hemorrhage of any considerable duration. A hand placed over the abdomen now feels the uterus contracted as before, but it is soon in a state of almost continuous contraction. There are, at first, periods of relaxation, but these periods are shorter and less pronounced. In normal cases, such as are now being described, the continuous, firm contraction of the uterus at the end of fifteen or twenty minutes convinces the nurse that all danger of postpartum hemorrhage is over. As a rule, however, she should not leave the patient in less than thirty minutes after the birth of the placenta, and then she should keep close watch of the uterine contractions for another half-hour.

As soon as the child is born and wrapped in a warm blanket (see p. 282) the wet pads under the mother are exchanged for dry ones, so that she may lie in comfort during the third stage of labor. After the birth of the placenta, as soon as it is evident that there is no serious hemorrhage to combat, the soiled pads and draw-sheets are removed, the patient is cleaned thoroughly and the napkin and bandage are applied, as will be directed in the next chapter. The washing of the patient and changing her from the childbed to the lying-in bed is accomplished without distracting our attention from the condition of the uterus.

POSTPARTUM HEMORRHAGE.

Hemorrhage after labor or postpartum hemorrhage is one of the most serious complications with which the obstetrician and the obstetrical nurse have to deal. Its causes and the methods of preventing and managing it should be thoroughly understood by the nurse, for it is a condition that demands immediate action and generally permits of no delay, such as would be caused by waiting for a physician. If a nurse is alone with the case she should always keep in mind the possibility of hemorrhage and make every preparation beforehand to meet it. Preparation is of the utmost importance. The sudden loss of a large quantity of blood is likely to upset the most experienced. The well-grounded fear that a patient may die in a few moments unless effectual aid is given, calls not only for a clear head but also for well-trained, systematic, vigorous action.

Causes of Hemorrhage.—Let us consider first the causes of postpartum hemorrhage. A comprehension of this subject will necessitate a short study of the mechanism by which hemorrhage is prevented in ordinary cases of normal labor. You will remember that when the after-birth separates from the uterus it carries along with it a part of the decidua (see page 62). The line of separation of the placenta passes through the middle of the decidua or changed uterine mucous membrane. In this plane there are numbers of blood-vessels and blood sinuses which supply nourishment to the fetus. Of course, many of these vessels are torn open by the separation of the placenta. The question is: "Why is there not always an alarming hemorrhage from these torn vessels? What is the mechanism by which these vessels are closed?"

To answer these questions we must take into consideration the arrangement of the fibers of the uterine walls. In the unimpregnated uterus the muscle fibers cross each other and interlace in a very complicated system. During pregnancy these muscles not only enlarge and elongate, but also change their relation to each other so that they come to

lie somewhat parallel with each other. As soon as the uterus is emptied the uterine muscle fibers not only contract but also immediately begin to assume the arrangement that existed before pregnancy. In this way, that is by a combination of prolonged contractions of the uterine muscle fibers and a resumption of their interlacing arrangements, the bloodvessels, passing in a tortuous manner through the uterine walls among the individual fibers, are so contracted that their caliber is nearly or entirely closed. This allows the formation of clots in the vessels which gradually organize and obliterate them.

It is therefore by the action of the uterine muscles that postpartum hemorrhage is prevented. The continuous contraction and rapid rearrangement of the muscular fibers close the vessels so quickly and surely that ordinarily only a few ounces of blood, and sometimes indeed only a few drams, escape after the birth of the placenta.

Atonic Hemorrhage.—We can now understand how a failure in the contraction of the uterus may lead to bleeding. We may here use the term contraction to denote not only the contraction of the individual fibers, but their rearrangement. This uncontracted condition of the uterus is often called atony of the uterus, which means, of course, its lack of power; and a hemorrhage resulting from such atony is called atonic bleeding. The bleeding goes on continuously from the unclosed vessels of the uterus, and chiefly from those of the placental site. The blood may flow away almost continuously through the dilated cervix, or as usually happens, the cervix may contract sufficiently to partly close for a moment the exit from the uterus. In this case the blood will accumulate inside the womb and distend it until it may become nearly as large as it was before the expulsion of the child. A contraction will then force out this enormous mass of blood from the uterus and vagina to the outside, when the process of filling and emptying the uterus will again be repeated until the patient dies from the loss of blood. As a rule the hemorrhage, shown by the appearance of blood on the outside, is more or less intermittent, corresponding to the contractions of the uterus which force out the blood.

If the hand is held over the abdomen in such a case of hemorrhage it will be noticed that the uterus becomes large and soft and frequently indistinguishable. No blood will then escape from the vulva until by rubbing with the hand the uterus contracts and becomes hard and a gush of blood appears. When it again relaxes, a sign that the blood is filling up the uterus, the external hemorrhage ceases. These observations show us that it is not the appearance of the blood on the outside that we need fear. Massaging of the uterus or perhaps a movement of the patient causes a uterine contraction and expulsion of the blood, and this frightens the patient and perhaps leads her to think that the rubbing makes her bleed and therefore is dangerous. We know that the blood that is collected in the uterus is already on the outside of the bloodvessels of the patient and is no longer of any value to her. It is only a source of danger in the uterus, for it prevents the firm uterine contractions, hence it is much better outside the body. As we shall learn in a moment, when we come to speak of the management of hemorrhage, we seek to control the escape of blood from the bloodvessels and not the retention in the body of the blood already lost to the patient.

Weakness or atony of the uterus is more apt to occur after a long and severe labor, or in cases where the uterus has been unusually distended, for example in twin pregnancies or hydrannion. It is at times the result of a premature expression of the placenta. After the severe contractions required to expel the child it would seem natural that an interval of rest were necessary before the final stage of labor. Interference which deprives the uterine muscles of this interval of rest is often a cause of subsequent inefficient contraction and resulting hemorrhage.

Hemorrhage from Partial Detachment of the Placenta.—Another important factor in preventing efficient uterine contraction and producing hemorrhage, is the presence in it of a more or less detached placenta. Until the placenta begins to separate there is, of course, no hemorrhage from the placental site. When a part of the placenta remains adherent to the uterus it may prevent a thorough contraction

of the uterine muscle and thus give rise to bleeding from the denuded portion of the uterine wall. This may happen whether the partially separated placenta remains in the uterus or whether the separated portion has been expelled, leaving a piece of the adherent placenta.

We therefore have two classes of cases, one where there is a partial separation of the placenta and the other where there is complete separation of the placenta. When there is partial separation of the placenta the entire after-birth may remain in the obstetrical canal or the separated portion may be expelled.

Traumatic Hemorrhage.—Postpartum hemorrhage may also be due to tears in the obstetrical canal, generally in the cervix or the vagina. A large tear, sufficient to cause considerable or serious hemorrhage, rarely occurs in uncomplicated, spontaneous labor, but is due generally to operative interference. It consequently does not interest the nurse so much as atonic hemorrhage, since she is never alone and obliged to assume the responsibility of these cases. It will consequently be necessary to mention only the cause of the hemorrhage and perhaps to point out how it may be distinguished from that due to atony of the uterus. Hemorrhage due to tears or lacerations is continuous, while in atonic bleeding the external hemorrhage is intermittent or ceases, at least in part, after contractions of the uterus.

Hemorrhage from Deficient Coagulability of the Blood.—Still another cause of postpartum hemorrhage is occasionally found in the altered condition of the blood. Unless the blood possesses a certain power to coagulate or clot the stoppage of hemorrhage from a ruptured vessel is impossible. Blood varies in its coagulative ability. There are some people whose blood has very little tendency to clot, and these individuals bleed very freely whenever the smallest vessels are ruptured. A slight cut, pulling of a tooth, or blowing of the nose may be followed by a very severe bleeding. These people are often called "bleeders." It is evident that a woman who has this bleeding tendency would be in more danger from hemorrhage after labor than a woman not so affected. In some kinds of disease also the

coagulability of the blood is diminished. This is true of malaria for example. If the nurse has reason to think, from the past history of the patient, that she is liable to attacks of frequent and severe hemorrhage, she should, of course, take unusual care to prevent and control hemorrhage after labor.



FIG. 74.—Partial or incomplete inversion of the uterus. The placenta is still attached and hemorrhage may not occur until its separation begins.

Inversion of the Uterus.—One other cause of postpartum hemorrhage is the occurrence of a serious accident known as inversion of the uterus. This is a turning inside out of the womb, due to traction upon the placenta or sometimes to pressure made in the effort to expel the placenta, or sometimes it happens spontaneously while the cervix is still open so as to admit of the passage through it of the base of the organ. It is, of course, a very serious accident not only on account of the hemorrhage but on account of the shock. It is very rare, and is only mentioned as one of the possibilities which the nurse has to bear in mind. (Fig. 74.)

Prevention of Postpartum Hemorrhage.—The prevention of postpartum hemorrhage is mainly, so far as the nurse is concerned, its prompt and vigorous treatment at the instant of its appearance. As was said above, hemorrhage might be due to the improper expression or extraction of the placenta. As a nurse, however, should never attempt to extract the placenta, unless such a measure were indicated by hemorrhage, it is not necessary to allude further to this point.

Removal of the Partly Adherent Placenta.—In considering the treatment of postpartum hemorrhage we must take into account the question of the presence or the absence of the placenta in the uterus. If bleeding occurs before the placenta is born we have a partly adherent placenta which prevents an efficient contraction of the uterus; hence it is necessary to get rid of the after-birth in order to stop the bleeding.

We must, therefore, consider the methods of extracting or expelling the placenta. Three may be mentioned: Traction on the cord, Credé expression, and manual separation. The first method, that of removing the after-birth by pulling on the cord, should never be practised. Unless the placenta is very tough it might tear in two and a portion be left behind in the uterus. If it is very tough and firmly adherent the uterus might be inverted by forcible pulling.

Expression of the Placenta.—Expression is the proper technic to employ in removing the placenta. It is called the Credé method because it was described and advocated by the great German obstetrician who taught many years in Leipzig. It is also and better called the Dublin method, because it was practised in the Rotunda Hospital in Dublin even long before the time of Credé. It is performed in the following way: The fundus of the uterus is grasped as well as possible in the hand through the abdominal walls, the separated fingers passing behind and the thumb in front. If the nurse is on the right side of the patient she grasps the uterus with the left hand. Before beginning the manipulation the uterus has been rubbed to secure a contraction. As soon as it begins to harden the expression begins. Having grasped the uterus it is squeezed in the hand, at the same

time pressing down in the axis of the outlet of the pelvis. A firm grasp and an energetic pushing movement must be continued for one or two minutes or until the placenta appears. If this measure does not succeed and the hemorrhage is very great the nurse may repeat the manipulation, using both hands. She must remember, however, that the



FIG. 75.—Credé's method of expressing the placenta. (Bumm.)

expression of the placenta is to be done only when there is great danger of bleeding. A slight hemorrhage or one that is easily controlled by a little rubbing over the uterus is not an indication for interference.

Manual Removal of the Placenta.—The third method of removing the placenta by the introduction of the entire

hand into the uterus and peeling it off from the surface is one that is required very rarely, perhaps 2 or 3 times in 1000 cases, and should never be done by the nurse except in the most extreme cases. It is a dangerous manipulation, because the patient is subjected to very great danger of infection by the introduction of the hand into the raw, absorbent uterus. As there is probably not 1 case in 10,000 where this manipulation will be required of a nurse it need not be further described. In practically all cases where the nurse is alone with the patient, where the removal of the placenta is necessary, the Credé expression properly performed will succeed.

When the bleeding begins before the expulsion of the placenta the nurse should at once tie the cord and separate the child if it still remains attached. She should then rub the uterus through the abdomen somewhat vigorously to stimulate the uterine contractions. If the bleeding continues moderately the massage should be persisted in. If the bleeding becomes more serious she should then try to secure a uterine contraction by rubbing and then grasping the uterus and express the placenta. If she should not succeed at first her efforts may, however, produce sufficient contraction to control the hemorrhage. If not, and the hemorrhage becomes alarming, expression with both hands must be made. Afterward the steady, persistent massage of the uterus through the abdominal wall to keep up the contraction, aided by other measures about to be described, will be indicated.

A question may arise concerning the measures to take in case a portion of the placenta remains in the uterus. When there is no hemorrhage this adherent placenta will cause no trouble and must be let alone. It will seldom happen if the third stage of labor is properly managed. Probably it will never be a source of danger so great that it will not permit the calling of a physician.

Management of Atonic Hemorrhage.—When we now come to consider the management of hemorrhages that occur after the expulsion of the placenta we must mention the stimulation of the uterine contraction by massage of the

uterus through the abdomen, by hot-water douche, and by the administration of pituitary extract or ergot, and the combating of the serious and dangerous symptoms by attending to the position of the patient, by bandaging the extremities, and by the hypodermic injection of salt solution.

Massage.—Attention has been called already to the importance of keeping the hand on the abdomen after labor for the purpose of studying its condition, and perhaps exerting a slight stimulating effect on the uterus. In order to stimulate efficient uterine contractions in case of hemorrhage, vigorous manipulation must be made. The hand should move up and down and back and forth across the uterus, pressing the fingers behind the uterus so as to grasp it as in the Credé expression. Squeezing movements as well as rubbing with the ends of the fingers should be employed. These manipulations must not be discontinued as soon as the hemorrhage stops, but should be employed for twenty to thirty minutes to prevent relaxation. A supplement to the hand in the stimulation of the skin may be had in cold. A piece of ice or a cold, wet towel placed over the lower abdomen may help at first in starting the uterine contractions.

Hot Douche.—The next measure against hemorrhage is the hot vaginal douche. It is immaterial whether sterile water or some weak antiseptic substance be employed. A large quantity may be needed, perhaps gallons. The main thing is that the douche should be hot. It should have a temperature of 120° F. Warm water from 100° to 110° F. has only a relaxing effect, while water of 120° F. is a powerful stimulant to the contracting fibers of the bloodvessels and to the involuntary uterine muscles.

It is very essential that the douche should be given promptly. It should always be prepared before the completion of labor. The bag or receptacle is filled and all that is needed is to pull the patient over to the edge of the bed, turn up the edge of the rubber draw-sheet, introduce the tube, and let the water run. If the bed has been prepared as before described and the douche prepared the irrigation should begin within twenty seconds from the

beginning of the hemorrhage. Provision must be made to keep up the flow. Someone must assist in filling the



FIG. 76.—Giving a hot vaginal douche for postpartum hemorrhage. The patient lies on the right side of the bed with her right leg supported on a stool. The nurse is separating the labia with the thumb and fingers of her left hand and is about to insert the douche point which she holds in her right hand.

irrigator. It will then be possible for the nurse, sitting by the bed, to support the patient, whose right hip and thigh lie partially over the edge of the bed with the foot resting

on a chair or stool, and at the same time with her left hand to keep up the massage over the uterus.

It should be repeated and emphasized that the douche should not be stopped as soon as the water begins to come away clear. A return of the hemorrhage is always to be feared and a cessation of the bleeding fifteen minutes is necessary before one is justified in withdrawing the stimulus of the douche. It may be continued an hour or more. When it is given as advised the patient is not at all disturbed and may even go to sleep while the water is running.

Oxytocics.—Pituitary Extract and Ergot.—The third means to stop uterine hemorrhage is the use of oxytocics or agents to excite and strengthen uterine contractions. The anterior lobe of the pituitary gland has this remarkable property, and a preparation of this substance from the gland of the sheep is prepared by various manufacturers for hypodermic use. It is put on the market in ampoules each containing from 0.5 to 1 cc which is the average dose for hemorrhage.

Ergot is also a powerful oxytocic whose action is somewhat more permanent than pituitary extract. It is given generally by the mouth, in the fluidextract preparation, in the dose of 1 to 2 drams.

Summary of Treatment of Postpartum Hemorrhage.—As with the douche, so the hypodermic injections of pituitary extract have been prepared beforehand in order that no time may be lost. The order of proceeding will be as follows: If a sudden hemorrhage appears the patient is drawn to the edge of the bed and the douche begun; with the left hand the nurse manipulates the uterus through the abdominal walls, with the right hand she takes her syringe and injects the pituitary extract. Then she is at liberty to supervise the filling of the douche bag or can, and to watch the patient and the effect of her measures. There should be no confusion. The patient need not be alarmed. The nurse knows what is to be done and has confidence in herself because of this knowledge. Under no circumstances should she change from this routine and try a number of measures one after another. But three measures have been described, and these are all that are necessary if efficiently employed.

If the physician be present he may pack the uterus with sterile gauze. This is an operation which a nurse would never be expected to perform, and therefore it is not necessary to describe it in detail. Many other things have been advised from time to time, but none are as good or as safe as these, and the importance of persistent action along a definite line is so great that it seems best not to introduce any complication by recommending other agents.

Combating After-effects of Hemorrhage.—In a severe hemorrhage the patient becomes dizzy and faint, and perhaps nauseated, has difficulty in breathing, perhaps hears a buzzing in her ears and, of course, looks very pale. These symptoms are due to lack of blood in the brain, which suffers very promptly upon the failure of the circulation. The pulse is very weak. The heart requires a certain amount of fluid in order to contract properly. The character of the circulating fluid is of less importance than the quantity. If two pounds of blood be drawn from the body suddenly there is greater distress than if twice that quantity were drawn slowly in twenty-four hours. In the latter case the quantity is made up by the passage into the vessels of the fluid outside of them.

In order to combat the symptoms and dangers due to the hemorrhage it is necessary to make use of all the blood that remains and to inject into the body a substitute for the lost blood. We make use of the remaining blood by putting the patient in such a posture that the blood will flow to and remain in the center which controls the vital processes, namely, the head. The head is lowered and the body elevated. The pillow is removed and the foot of the bed raised. In extreme cases this may be supplemented by bandaging the extremities. A nurse, when she is alone, would, of course, never leave her position at the side of the patient where she is giving the douche and kneading the uterus. She may, however, be called upon by her physician to do this. For the purpose of bandaging, a sheet may be torn into strips 3 or 4 inches wide, quickly rolled and applied firmly, beginning at the toes and passing up as far as possible on the thighs.

Hypodermoclysis.—The lost blood is substituted by the normal salt solution. This may be best administered by means of a fountain syringe or by the use of a reservoir with a tube, employing the principle of gravity. Into the further end of the rubber tube is placed the large stem of a glass Y, which is to divide the stream. To the smaller limbs of this Y are attached smaller pieces of rubber tubing $\frac{1}{2}$ yard long, which carry large hypodermic needles. With this apparatus the solution may be introduced into two separate parts of the body at the same time and with considerable rapidity. The parts best adapted to receive the saline solution are the fronts of the thighs. The method of preparing the solution and using it is as follows:

Unless the physician or nurse is provided with sterile salt tablets ordinary clean table salt will answer. There being no exact measure at hand, let her take a medium-sized teaspoon, fill it with salt lightly, not packing the salt, and then with a straight edge, as, for example, the edge of a knife-blade, strike off the extra salt. This level teaspoonful of salt is sufficient for 1 pint of water. The water used should have been boiled. Into the water the salt is placed and then boiled again in order that the solution may be perfectly sterile. If a great quantity of the solution is needed, of course double the quantity of salt and water will be employed. If the nurse anticipates the use of the solution she would better prepare it of double strength beforehand. It may then be diluted with warm water when needed for use. The apparatus for the introduction of the salt solution should be put together and wrapped in a towel or piece of gauze and put into a kettle and boiled, when it is ready to receive the solution.

The proper temperature of the solution is about 98° to 99° F. A variation of 3° or 4° is, however, unimportant. Since the solution cools during the process of introduction a little hot solution should be added from time to time or a flame placed under the receptacle. To determine the temperature a sterilized thermometer should be on hand. The thermometer included in a glass connecting link that can be inserted in the tube is desirable. One may estimate

the temperature fairly accurately by allowing the solution to flow from a needle over the back of the hand. Everything being ready, the skin in the region of the proposed puncture is disinfected and the needles introduced. They should not pass too close to the skin, neither should they



FIG. 77.—Hypodermoclysis. Injecting normal salt solution into the thighs.

pass too deeply into the muscles. Before introducing them the receptacle is raised and the solution allowed to flow until the tube and needles are full of the warm solution. The rapidity of the flow will depend partly upon the height of the receptacle, partly upon the nature of the tissue into

which the solution is introduced, and partly upon the massage manipulations which help in the absorption of the fluid. Ordinarily 1 to 2 pints can be injected in fifteen minutes.

Long before the injection of this amount is completed its effects are apparent. The pulse improves, the patient breathes more easily, and the terrible feeling of thirst is allayed. The salt solution, moreover, has not only a temporary but also a permanent effect. Patients recover much more rapidly and without complications after its use. While the nurse will hardly ever, and perhaps never, be called upon to use the salt solution upon her own responsibility, she should understand the technic of its preparation and administration so that she may prepare it and use it properly when ordered by the physician.

DYSTOCIA.

Definition.—Dystocia, or abnormal labor, occurs when there is some abnormality in the forces of labor, in the passages, in the passenger, or in the mechanism of labor. Likewise any accident occurring during labor is a cause of dystocia.

According to this definition, postpartum hemorrhage (see page 167), separation of the normally seated placenta (see page 93), and other conditions already discussed are cases of dystocia. Although its management is always the business of the physician, it is desirable that the nurse should have a brief outline of the subject.

Dystocia from Abnormal Forces.—The contractions of the uterus may be excessive or weak. Excessive contractions may be too strong, they may last too long, or they may be too frequent. When the contractions come so fast and last so long that the resting periods are no longer than the contracting periods the contractions are pathological. When the contractions are practically continuous they are said to be tetanic. We shall not discuss the causes of excessive contractions except to say that ergot or pituitary extract will produce them. The most important result is the injury or death of the child by the compression of the

placenta and the uterine vessels. Precipitate labor may result and also rupture of the uterus. The treatment is generally the administration of sedatives or anesthetics.

Weak contractions lead to inertia or atony of the uterus. The contractions may be less in intensity, shorter, or less frequent. This condition may be primary at the beginning of labor, or secondary, occurring during labor. In the latter case it may be due to exhaustion following excessive contractions. The chief danger is the exhaustion of the mother and in the third stage of labor, atonic hemorrhage. The treatment depends upon the cause of the atony and the condition of the patient.

Dystocia from Abnormal Passages.—Contracted and other deformed pelves (see page 33) may interfere with or absolutely prevent the passage of the child. The treatment may be delivery by forceps or by enlarging the pelvis or by a delivery through a Cæsarean section. Ovarian tumors and tumors of the uterus may prevent normal delivery and require removal of the obstruction or of the child.

Fetal Dystocia.—**Dystocia from Abnormalities in the Passenger.**—Occasionally a child is too big to pass through even a normal pelvis. This may be due to retardation of the labor or to hereditary influences. The case must be managed like one of contracted pelvis. Sometimes deformities of the fetus, like fetal tumors, hydrocephalus, etc., make labor abnormal and require interference.

Twins.—In this connection we may speak of multiple pregnancies in which the labors are frequently abnormal. Twins occur once in about 90 pregnancies and triplets once in about 8000 pregnancies. Heredity is a factor in the causation; a history of twins on either the mother's or father's side is nearly always found. They may originate in different ways. Two Graafian follicles may rupture simultaneously and both ova be fertilized, or there may be two ova in one follicle. Then one ovum may have two nuclei. Finally after the fertilization of an ordinary ovum the nucleus may divide completely and each half develop as a separate egg. When the twins are from the same egg both are of the same sex. When they are from different

eggs they may be of different sexes. When they are from one egg there is often a connection between their placental vessels. In this case after the birth of the first child if the placental end of the cord were not tied before cutting the second child might bleed to death.

The great distention of the uterus may interfere with its normal contractions. Sometimes the fetuses become locked. After the birth of the first child the delivery of the second may be delayed. Finally postpartum hemorrhage is always to be feared.

Short Cord.—Rarely the cord is so short that it does not allow the escape of the child from the vagina. More frequently the cord is rather long but coiled several times around the neck of the child, so that it also prevents the birth of the child. Ordinarily one or two coils around the neck cause no disturbance in the labor.

Prolapse of the Cord.—One of the most serious kinds of fetal dystocia is prolapse of the cord, which occurs about once in 150 labors. It is more often found in cross-presentations of the fetus and in labors in flat pelvis. As it generally results in death of the child unless it is properly managed it is important to make an early diagnosis. Unfortunately without an internal examination a diagnosis can hardly be made before the cord appears at the vulva. Any marked irregularities in the fetal heart tones would raise a suspicion of pressure on the cord. Hence this is another reason why the nurse should watch the heart tones carefully. Should the cord present at the vulva, or should there be other reason to suspect a prolapse of the cord while waiting for the physician, the patient should first take the knee-chest position for three or four minutes and then lie with the hips much elevated so as to favor the reposition of the cord by gravity.

Dystocia from Abnormal Mechanism of Labor.—Here we have abnormalities in one or more of the steps of labor. We may have abnormal presentation at the inlet. Instead of the vertex or the occiput the brow or face or the side of the head may present. In some cases the breech or foot or shoulder may be in advance. In the excavation the head

may not undergo proper internal rotation. If no rotation takes place and the occiput remains to one side the condition is called deep transverse arrest. If the occiput rotates backward we have the so-called occiput posterior, a condition that makes spontaneous labor slow and difficult. Sometimes there is a compound presentation such as an arm or leg with the head. When the progress of labor is not satisfactory some abnormality in the mechanism is to be suspected.

Dystocia Due to Accidents.—Eclampsia, placenta previa, postpartum hemorrhage, separation of the normally seated placenta, and inversion of the uterus, which have already been considered, belong here. Another pathological condition during the third stage is the adherence of the placenta and membranes. Partial adherence with resulting hemorrhage has been discussed (see page 169). Complete adherence is generally attended with no hemorrhage and need not disturb the nurse. She watches the patient carefully and waits for the physician.

Rupture of the Uterus.—This accident is fortunately very rare, occurring only once in about 1000 labors. The tear is generally found in the lower uterine segment at the junction of the cervix and body. Spontaneous rupture follows excessive contractions in an obstructed labor, for example in a case of transverse presentation. The lower dilating segment becomes very thin and finally gives way. Artificial rupture results from some operation like turning, forceps, etc. The immediate results of rupture are pain, shock, cessation of uterine contractions, hemorrhage, internal and external, and disappearance of the fetus. Practically all children die, and in spite of treatment about 50 to 70 per cent of the mothers. It is important to know that this terrible accident is possible in a very hard labor, especially when the contractions are very severe.

Vulvar and Perineal Lacerations.—The way for the nurse to prevent laceration has been described. The physician will generally repair them after the expulsion of the placenta if the patient is in condition. Sometimes small tears are repaired while waiting for the placenta to come away.

The nurse will be called on to assist in the operation or in the anesthesia. Preparation must be made while waiting for the third stage unless everything was in readiness beforehand.

OBSTETRICAL OPERATIONS.

Frequency.—If all kinds of operations are considered, including repairs of lacerations, they probably occur in one-fourth to one-third of all cases of labor. This fact indicates the importance of the subject. The nurse must prepare for them and assist at them. It is necessary, therefore, that she knows their object and general character and the names and uses of the instruments employed.

The following classification of obstetrical operations may be of value in furnishing a general oversight of the subject:

Preparatory Operations.

Induction of labor and abortion.

Dilating: cervix (metreuryisis).

Vagina and vulva (colpeuryisis and episiotomy).

Pelvis (symphyseotomy and hebosteotomy).

Improving position and attitude: turning, changing position and presentation, replacing parts.

Delivery Operations.

Expression: Kristeller or expressing body; Hofmeier, expressing head.

Forceps: low, middle, and high.

Mammal extraction.

Cæsarean section: classical, Porro, extraperitoneal, cervical transperitoneal, vaginal.

Embryotomy: perforation and cranioclasia, decapitation.

Third Stage Operations.

Manual extraction, Credé expression, expression from vagina.

Reparatory Operations.

Cervix, vagina, vulva, perineum.

Accessory Operations.

Douche; vaginal and intra-uterine.

Hypodermoclysis.

Preparation.—The more serious preparatory, delivery, and reparatory operations should be done in a hospital when one is accessible and the transfer of the patient is possible. When it is necessary to operate at home the best possible preparation should be made. The largest, warmest, best lighted, and most convenient room in the house should be chosen. Frequently the kitchen or dining-room possesses these qualifications. Rugs should be removed from the



FIG. 78.—Kitchen table arranged for an operating table. The sheet on the table is to be used as a leg-holder.

floor and a carpet should be covered with an oil-cloth or with sheets. In daytime light is secured from windows, which may be rendered translucent when necessary by a temporary sash curtain or by coating the glass with soapsuds. The table is placed so that the light falls most advantageously on the genitalia. At night if the house has electric lighting the bulb may be held or hung so as to give an ideal illumination. Generally an extra powerful lamp may be secured. If only an overhead light is available, as with a

gas jet, the table should be placed so that the light comes from behind the operator at an angle of about 60 degrees. Lamps can rarely be placed behind the operator in good position, and he sometimes uses a head mirror to reflect the light from the lamp placed safely at the side.

For most operations the ordinary kitchen table makes a very satisfactory operating table. As the patient is generally in the lithotomy position it is long enough. It should be covered with a blanket and a clean sheet. A rubber or oil-cloth sheet is laid on the end of the table and drawn into a pail or jar for drainage.

Slight repair operations may be made with the patient in bed, her hips being elevated on the douche-pan, or she may be turned across the bed. More extensive repairs and all delivery operations should be done on a table.

Behind the table is a plain chair for the operator. At his right hand is a large table or two small ones, covered with a clean sheet to hold the instruments, basins with solutions, pitchers, sponges, sheets, towels, etc. At one side is the irrigator hung up and filled ready for use before the patient is brought to the table. A long sheet rolled diagonally, to be used as a leg holder, is placed on the operating table.

Most operations are better made under anesthesia. Although the services of a physician or a trained anesthetist should always be secured if possible, yet sometimes in an emergency the nurse must give the anesthetic. The administration of an anesthetic to produce complete anesthesia is more difficult and involves greater responsibility than the use of a little ether during contractions to dull the pain of labor. As ether is always much safer than chloroform, probably a physician would choose it if the nurse is the anesthetist. It is to be given in the way already described, but continuously. The patient may pass through stages of exhilaration before she is under the influence of the drug. This part of the process is, however, watched by the physician. Later when it is necessary to hold the patient unconscious she must carefully observe the pulse and respiration as well as the color of the face. A nurse should take every opportunity of watching the adminis-

tration of anesthetics and particularly learn how to hold the jaw so as to keep the tongue from dropping back and impeding respiration.

Induction of Abortion.—This operation is made only in those extreme cases of pregnancy complicated by serious heart disease, kidney disease, tuberculosis, or similar affection, when the operation is necessary to save the life of the mother. When the operation is not absolutely necessary it ceases to be legitimate; then it is not a therapeutic but a criminal abortion. It is forbidden by law under penalty of imprisonment. If the patient should die as the result of a criminal abortion the operator is guilty of murder. Hence to avoid any suspicion every physician will consult with a reputable colleague before deciding upon making a therapeutic abortion. He will also secure the consent in writing of the patient and if possible of her husband or next of kin. The operation can generally be done in a hospital.

Before the fourteenth week the operation can be done at one sitting by rapid dilatation and curettement. The instruments needed are a branched dilator or a set of Hegar's dilators, a curette with a flexible shank, 2 vaginal retractors, 2 volsellum forceps, and a dressing forceps for eventual packing.

Between the fourteenth and twenty-eighth week it is generally necessary, on account of the size of the fetus, to make a preliminary dilatation with tents, followed after twelve hours with further dilatation and curettement. It is necessary that the tents should be sterile. They cannot be boiled, of course, because they swell upon being brought in contact with a watery fluid. They can be put into and kept in strong alcohol after they have been sterilized with dry heat.

To introduce the tent anesthesia is not generally necessary. The patient must be shaved and otherwise thoroughly prepared. The instruments needed are the vaginal retractors, a volsellum forceps to grasp the cervix, a small dilator for preliminary dilatation, and a dressing forceps to hold the tents. One or more are introduced according

to the size of the tents and the amount of dilatation of the cervix. Frequently a small vaginal packing of sterile or antiseptic gauze is used to help keep the tents in place. After about twelve hours the patient is anesthetized and the tents removed, the cervix further dilated with instruments or digitally, and then the fetus and placenta are removed. This is accomplished with the fingers alone or with the fingers and curette combined. Packing for postpartum hemorrhage or to help the contractions of the uterus must be in readiness; likewise ergot and a hot douche.

Sterile petrolatum or oil should always be on hand to lubricate the dilators and the tents.

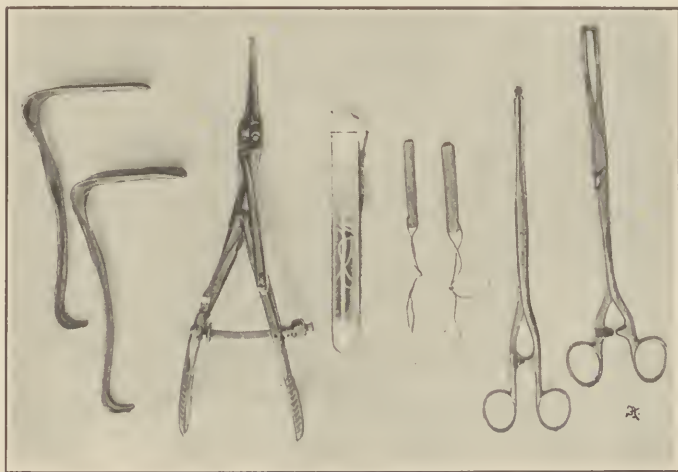


FIG. 79.—Tents, and instruments for introducing them, to induce abortion.

Induction of Labor.—Labor may be induced because of some disease of the mother, like heart disease, kidney disease, consumption, or threatened eclampsia, which threatens her life if pregnancy continues. Here the operation must be done when the mother's condition requires it, although in general it is postponed as long as possible on account of the child. Sometimes the operation is done because the pelvis is too small to admit the passage of a full-term child

while it is big enough for a child of thirty-five to thirty-seven weeks. Here the labor is never induced before the thirty-fifth week because a younger child has too poor a chance of living.

Preparations for this operation include not only the usual preparation of the mother but provision for the child. It must be handled with care, and especially must it be protected from chilling. Possibly an incubator should be provided as well as a tank of oxygen, and the nurse should be ready to care for the child as directed in the discussion on the management of premature infants (see page 319).

One method of inducing labor is the introduction of one or more bougies into the uterus. The hollow bougies with the stylets are sterilized by boiling. The other instruments needed are a vaginal retractor, a volsellum forceps, and a dressing forceps. No anesthetic is necessary. The operation is done with the patient in the lithotomy position on a table. Solutions and sponges are, of course, in readiness as well as gauze for packing the vagina.

Labor rarely starts very promptly after the use of the bougies. If regular pains do not come on in the course of eighteen hours the physician removes the bougies, cleans the vagina thoroughly, and introduces others. When labor is well started the bougies are permanently removed. Sometimes when there is a large amount of liquor amnii or when the patient is suffering from dyspnea, labor is induced by simply rupturing the membranes. This may require no instruments, the physician simply breaking the membrane with the examining finger or perhaps with a rather sharp pointed blade of an artery forceps.

The most common method of inducing labor is the dilatation of the cervix with a bag. Such a bag is called a metreurynter, and the process is metreurysis. The best kind of a metreurynter is non-elastic, made of a strong tissue which is vulcanized. It has a tube for filling, by means of which traction can be made on the bag. The Voorhees bags, which are conical in form and come in different sizes, in sets of four or more, are most used in this country.

The bags are sterilized by boiling. For introduction there

are needed 2 vaginal retractors, 2 volsellum forceps, 1 sponge forceps to hold the bag, 1 dressing forceps, 1 or more dilators, sponges and solutions, a bulb syringe for filling the bag, and a ligature for tying the tube. A nervous and sensitive patient may need an anesthetic. The sterile bags and syringe, contained in a basin or pitcher of sterile water, are held near the vulva on the right side of the operator. After grasp-

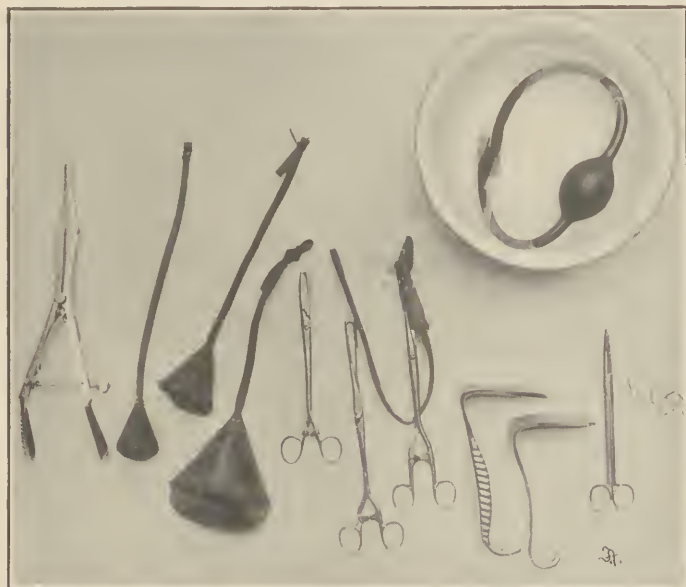


FIG. 80.—Instruments for metruerysis. One Voorhees bag is held in the forceps ready for introduction.

ing the cervix and dilating, if necessary, he punctures the membranes with the end of the dressing forceps and then carries the folded bag with the sponge forceps through the cervix into the amniotic cavity. Sometimes the membranes are not ruptured and the bag is inserted into the lower part of the uterus by pushing up the membrane. The physician then removes the vaginal retractors and, introducing the left half-hand into the vagina, he holds the bag in place while

he fills it with the bulb syringe worked with his right hand. When it is full he ties the tube and pushes it up into the vagina, retaining it there with gauze packing. Or if traction on the tube is desirable the tube is left protruding from the vulva.

Labor starts more promptly after the introduction of the bag than after the bougie. There are generally some contractions at once, which gradually cease. After a few hours they recommence and continue as genuine labor pains. Occasionally the first contractions continue and develop into regular labor. When it becomes necessary to hasten the labor the physician may make intermittent traction on the tube. The nurse is frequently entrusted with this duty.

Should labor proceed very vigorously for some time and then stop or become much weakened the nurse may suspect that the bag has escaped from the cervix and lies in the vagina. She may determine the condition by gentle traction on the tube if that has been left protruding from the vagina. She should notify the physician in any case of the change in the character of the pains.

Dilatation of the Cervix.—The objects of the various operations for dilating the cervix are to induce labor, to hasten labor, and to prepare for delivery operations. Metreuryesis, or bag dilatation, which has just been described, is the chief method used for inducing labor. It may also be used for hastening labor and also to prepare the cervix for delivery operations. Here other methods which are more rapid are generally employed. Especially for accouchement force, *i. e.*, rapid, forcible emptying of the uterus. These are manual or digital dilatation, the use of metal dilators, and incisions.

Digital or manual dilatation is done with the fingers of one hand or with two hands. The patient is thoroughly prepared, anesthetized, and on the table. All preparations for the following delivery are first made. No instruments are needed, but the proper solutions and sponges must be in readiness. The physician generally begins with one hand with the so-called Harris method, and after dilating to the size of the fist he then employs both hands in the Edgar method.

Metal dilators are rarely used in this country for complete dilatation, but only at the beginning, to provide for the introduction of a finger or a bag. The Bossi dilator, sometimes used in Italy and Germany, is a powerful instrument, but feared on account of the tears it makes.

When there is very great urgency the cervix may be opened by incisions. This is only possible after effacement. The incisions are generally anterior and posterior and extend 2 or 3 inches to the vaginal wall. They are made with a long handle angular scissors. The other instruments needed are 2 vaginal retractors and 2 tenaculum forceps. All preparations for the subsequent operation must be made.

Symphiseotomy.—Cutting through the junction of the pubic bones is called symphiseotomy. After the bones are separated the ends are pulled apart from 2 to $2\frac{1}{2}$ inches by abducting the thighs. This increases the size of the inlet of the pelvis one-third to one-half. The operation may be done in a moderately contracted pelvis when the course of the labor has shown that spontaneous labor is impossible and forceps delivery would be dangerous to mother and child.

The operation is generally followed by the immediate delivery of the child either by forceps or turning and extraction. Hence the preparation for the delivery must be made in advance. Repair work must also be provided for. Sometimes the bones are reunited by wire sutures. Generally they are held in contact with a band of adhesive plaster, which must be ready. The patient can be cared for better after the operation if she is placed on a sling bed that can be raised and lowered with pulleys. This also helps to keep the bones in apposition. The cross-strip under the patient's buttocks is made so that it can be removed for the care of the bowels and urine and frequent cleansing of the genitalia.

In preparing the patient for the operation the pubic region must be cleaned as well as possible. The instruments needed for the symphiseotomy itself are 2 scalpels, 1 for the soft tissues and 1 to cut through the symphysis, several artery forceps, scissors, small retractors, dry dis-

sector, needles, catgut and silkworm gut, needle forceps. Sometimes a special symphyseotomy knife, Galbiati knife, is used.

Hebosteotomy.—Instead of cutting between the pubic bones the pelvic girdle may be enlarged by cutting through one of the bones about a finger's breadth to the side of the symphysis. This operation is called hebosteotomy or sometimes lateral pubiotomy. The operation is generally done subcutaneously. A small incision is made through

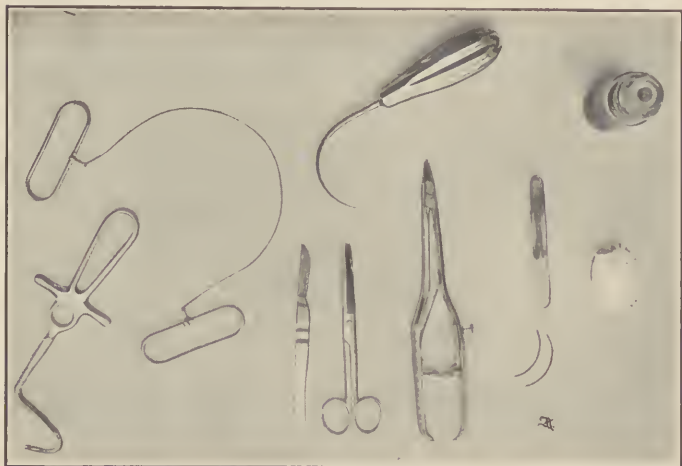


FIG. 81.—Instruments for hebosteotomy, showing Doederlein's and Bachele's needles, Gigli wire saw, collodion bottle, and cotton.

the skin and underlying tissues down to the upper border of the pubic bone. Through this opening a special needle is carried close behind the bone nearly parallel to the symphysis and emerges below the lip of the vulva. A wire saw, called a Gigli saw, is then attached to the end of the needle and pulled through the track of the needle as it is withdrawn. Handles are then attached to the ends of the saw and the bone is sawed through. As soon as the bone is divided the sawing is stopped in order not to injure the soft tissues. The pelvis is then enlarged by separating the

ends of the bone just as in symphyseotomy. After the delivery of the child the ends of the bone are brought in contact and held with an adhesive plaster bandage. A thread drain may be inserted into one of the openings, or both may be sealed up with collodion.

The instruments needed are the same as for a symphyseotomy with the addition of a hebosteotomy needle and a Gigli saw.

Version.—Version or turning is changing the presentation of the child. Cephalic version is changing a breech or a cross-presentation to a head. Podalic version is changing a head or a cross-presentation to a foot. External version is done by external manipulation alone. It may be attempted before labor or in the beginning of labor, and requires no special preparation. The physician may need the assistance of the nurse in the manipulation.

Combined version is turning with the fingers of one hand or the whole hand in the uterus in contact with the child and with the other hand on the abdomen. If the cervix is opened only so that the fingers can be introduced the operation may be called *combined digital version*. It is sometimes called Braxton Hicks' version, after the name of the English obstetrician who advocated and described the technic of the operation. When the whole hand can be introduced into the uterus through the cervix the operation is a *combined manual version*. This operation is often called simply internal version.

Combined version is nearly always podalic version, and is done to correct a cross-presentation or to bring the leg into the cervix to control bleeding in placenta previa or to secure rapid delivery, as in prolapse of the cord or after symphyseotomy. It should be done on a table with the patient anesthetized. No special instruments are needed unless it be a long dressing forceps or perhaps one blade of a scissors for puncturing tough membranes. The obstetrician should be provided with long gauntlet rubber gloves to cover his forearms. If an arm is prolapsed in a cross-presentation a long tape must be ready to slip over the wrist before it is replaced to assist in the subsequent delivery.

If extraction is to follow immediately, preparation must be made for the child and for repairs, as will be described in discussing extraction in foot and breech presentation. If labor is allowed to terminate spontaneously after turning, the patient and the unborn child must be watched very carefully. Generally the physician will remain with the patient, but if he should leave the nurse in charge for a short time she has a great responsibility not only to observe and judge the progress of labor but also to keep the patient clean with a limb projecting from the vulva.

Changing Face to Vertex Presentation.—As labor is always more difficult in the face than in the vertex presentation it is generally desirable to rectify this abnormal presentation. If it is discovered early before the membranes rupture the physician generally waits until dilatation is complete, when he ruptures the membranes and rectifies the presentation, or if the membranes rupture spontaneously before the cervix is open he at once changes the presentation. If the membranes have been ruptured for some time and the waters have drained away the uterus will have contracted firmly around the body and the head will have passed far along in the pelvis, making the operation much more difficult. Here the head must first be pushed up out of the pelvis. In all cases it is necessary not only to flex the head but also to change the attitude of the body from that of the dorsal flexion to ventral flexion. Sometimes this operation is done with the patient across the bed, but usually the use of the table is preferable. The physician introduces one hand into the vagina and uses the other for external manipulation. The nurse, if she is not giving ether, assists by pulling the breech to one side while the physician with the external hand pushes the shoulders to the opposite side.

After the operation, when the patient comes out of the anesthetic, it will be necessary to hold the head in the pelvic inlet during several pains in order that the contractions shall not bring back abnormal presentation.

Other preparatory operations are occasionally required. When the hand or foot presents by the side of the head it must be replaced. Anesthesia may be necessary. When

the head rotates improperly after its descent into the pelvis so that the occiput is posterior, the physician may introduce his hand into the vagina and turn the head around so that the occiput comes to the front. The nurse may be asked to assist in rotating the body by external manipula-

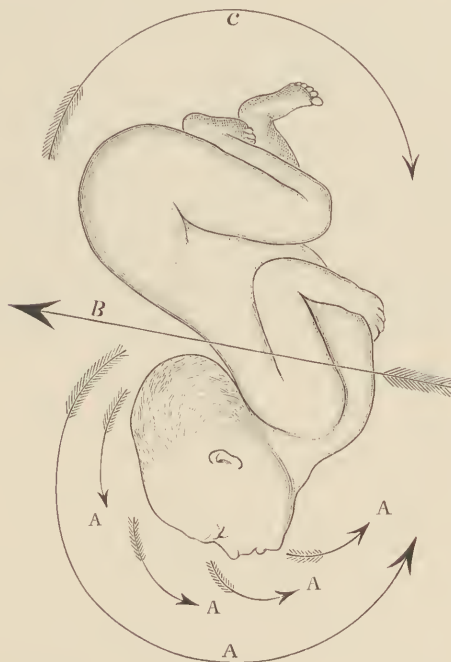


FIG. 82.—Correction of face presentation by manipulation. Arrows show direction in which various parts of fetus are carried by operator. *A*, toward the pubes; *B*, toward the sacrum; *C*, breech toward mother's anterior abdominal wall. (Thorn.)

tion. Frequently this is done without ether. Sometimes in a breech presentation the breech descends into the pelvis and then becomes impacted and cannot go farther. Here the physician will push back the breech and bring down a leg. This requires complete anesthesia. It is followed by extraction, for which preparation must be made in advance.

Expression of the Fetus.—Among the delivery operations the oldest and simplest is manual expression. From the earliest times of which we have record it has been the custom of midwives to assist in pressing out the fetus often with the cruelest and crudest procedures. About thirty years ago Kristeller gave the indications for the operation and described in detail the method of carrying it out so that the operation is often called Kristeller's expression. It is indicated only in the second stage of labor, and when there is delay and the pressing efforts of the mother are weak and insufficient. The physician stands at the side of the mother and grasps the uterus through the abdomen, with the thumbs in front and the fingers behind and at the sides, and presses the child downward. A certain degree of anesthesia, which may be entrusted to the nurse, is often necessary. Similar expression is made in breech extraction.

Another form of expression is that applied directly to the head to force it into the pelvis. This was specially recommended by Hofmeier, and is sometimes called by his name. It is used when labor is delayed because the head cannot enter the moderately contracted pelvis. Anesthesia is also required here.

Walcher Posture.—In the Hofmeier expression as well as in other operations where the head has not entered the pelvis because the inlet is too small the patient is frequently put into the Walcher posture. In this posture, as shown in Fig. 83, the lower extremities are extended on the hips so as to pull the symphysis away from the promontory. When the posterior or sacro-iliac joints allow considerable motion the antero-posterior diameter of the inlet may be increased nearly an inch. This enlargement may make considerable difference in case of a tight-fitting head.

In a hospital where there are a number of assistants and where a table can be had to lower the shoulders and raise the hips it is easy to secure this posture. In a private house it is more difficult. If the patient is on an ordinary kitchen table with the hips at the edge and legs hanging down she must be held by two or three people, especially when forceps are applied. Dickinson has proposed to secure elevation

of the hips, and thereby a more perfect posture, by using a kitchen chair firmly fastened upside down on to the bed or table and covering it with blankets and sheets.



FIG. 83.—Walcher posture.

Expressing the Head from the Vagina.—When the head is in the vaginal outlet, but held by a firm vulvar ring, it may be pushed out by pressing on the posterior wall of the birth canal at each side of the anus. This manipulation may also help to save the perineum from tearing. This measure is sometimes called the Ritgen expression, although that obstetrician proposed to introduce the fingers into the rectum to secure a better hold of the face or brow of the child. This, of course, contaminates the fingers and is no longer done. This manipulation is done only by the physician, and should not be attempted by the nurse when she is alone with the patient and obliged to conduct the labor.

Manual Extraction.—In foot or breech presentation, although labor may terminate spontaneously, the physician is always anxious for the life of the child. As soon as the body descends into the pelvis and passes through the cervix there is danger that the cord may be compressed between the shoulders or head and the sides of the pelvis or by the incompletely dilated cervix. This would cut off the supply

of oxygenated blood from the mother and the fetus would suffer, just as a person suffers when he is deprived of air. The fetus might begin to make respiratory efforts and thus draw fluid into its lungs and down in the fruit water.

To prevent this disaster the physician must be ready to interfere as soon as the hips begin to pass through the vulva. As a rule it is dangerous for the child to be more than three minutes passing out of the pelvis after the hips are born. Frequently the shoulders and head will be detained in the inlet or in the outlet, and traction on the portion of the body already born will be required. This is called manual extraction.

All preparation for this interference should be made in advance. Some physicians prefer to deliver all breech presentations on a table. The nurse must then have the table in readiness in the confinement-room or in a neighboring room and assist in transferring the patient to the table before the hips appear in the vulva. Other physicians turn the patient across the bed.

No anesthetic is given, as a rule, because all of the powers of the patient are needed to assist in the expulsion. If the patient should be very unmanageable it might be better to anesthetize her and rely upon traction and expression. The nurse must be prepared to conduct the anesthesia.

In combination with traction, pressure on the uterus from above may be desirable. Here the nurse may be of great assistance. Pressure is applied directly to the child's head in the direction of the axis of the inlet.

In all cases of breech delivery it is necessary to have everything ready for resuscitating the child: Aspirating catheter, hot and cold water, oxygen, etc., as described on page 273.

Sometimes, after turning, extraction is made immediately. The method of procedure does not differ materially from that just described for breech presentation.

Some physicians apply the forceps to the after-coming head. They will, of course, require the forceps to be in readiness.

Forceps.—In a head presentation, manual extraction cannot be employed without turning the child. In olden times version and extraction was the method employed to remove a child when spontaneous delivery was impossible. About three hundred years ago the forceps was invented for the purpose of ending difficult labors with head presentation. It is designed to grasp the head and hold it safely while traction is employed to extract it from the obstetrical canal.



FIG. 84.—Obstetric forceps: Milne-Murray axis-traction forceps, a common forceps with an English lock, a Naegele forceps with a notch lock, a Tarnier axis-traction forceps.

The ordinary forceps consists of two crossed pieces or branches. Each piece consists of a blade, a handle, and a shank. The blade is the broad part, about 7 inches long, that is applied to the side of the head. It is generally fenestrated to make it lighter and hold better. It has two curves, a head or cephalic curve to fit the head and a pelvic curve to correspond to the curve of the pelvis. The handle is thick and corrugated and often has a hook so that it may be better grasped in the hand. The shank connects the

blade and handle and elongates the branch so that it may be applied to the head when it is some distance above the vulvar outlet. The lock placed at or near the junction of the shank and handle is an arrangement for fastening the branches together.

There are numerous varieties of forceps differing in more or less important details. They are generally named from the obstetricians who devised the modification. Some forceps are made with a short shank and used at the outlet.



FIG. 85.—Preparation for forceps operation.

They are called short or outlet forceps. In a well-known short forceps the blades are solid. The English or Simpson forceps have the English lock, two shoulders fitting together. The French forceps have a pivot lock. One other kind of lock very frequently employed is the notch lock.

Forceps operations are classified as low, middle, and high. Low forceps is the application to the head in the lower half of the obstetrical canal. Middle forceps is the application to the head in the excavation or cavity of the

pelvis. High forceps is the application when the head is in the inlet or, rarely, above the inlet.

While the ordinary forceps can be applied to the head in the outlet, or in the excavation it will not answer as well for high forceps, for with it we cannot make traction in the right direction.

For use in the inlet, Tarnier devised a forceps that is sometimes called the inlet forceps, or more frequently the axis-traction forceps, because with it traction can be made in the line of the axis of the pelvis. The distinguishing feature of this forceps is the presence of traction rods and a handle. These rods are attached to the blades and pass below them out of the vulva, where they are bent backward so that the handle can be fastened low down.

Forceps is indicated in certain cases when there is danger to either mother or child. Certain conditions of the pelvis and uterus must be present to justify an operation. The discussion of this important subject is not appropriate in this work.

The operation would always be better made on a table. The physician needs 3 assistants: 1 for the ether, 1 to help hold the forceps and assist in expressing the child and later to care for the child, and 1 to bring solutions, towels, etc., and wait on him as may be required. Frequently, however, in private practice he must be content with the nurse and 1 colleague who generally gives the anesthetic. The nurse must prepare beforehand everything that may be needed, including solutions, sponges, douche, packing, and repair instruments.

Cæsarean Section.—When the pelvis is very small, for example, when the antero-posterior diameter of the inlet is less than 6 cm. or $2\frac{1}{2}$ inches, the child cannot be delivered through the maternal passages and must be removed by Cæsarean section; that is, through an opening made in the abdomen and the uterus. Such a contraction of the pelvis is said to furnish an absolute indication for Cæsarean section. When the pelvis is larger but still too small for spontaneous labor at term we may choose between Cæsarean section and other operations, namely, high forceps, symphyseotomy

and hebosteotomy, induction of premature labor, and embryotomy. This degree of contraction, therefore, is said to furnish a relative indication for Cæsarean section. The operation is also made sometimes on account of tumors in the pelvis which prevent normal delivery and for serious diseases of the mother, like eclampsia and placenta previa.

When the absolute indication is present the operation must be done even if the child is dead and the mother already infected. In other cases Cæsarean section would not be done for a dead child and rarely where there is infection of the mother.

If the physician can select the time for the section he prefers to operate at the end of pregnancy, that is, a day or two before labor is expected. After labor has begun, and especially after the membranes have ruptured and after the patient has been examined, there is more danger of contamination of the patient and consequently more risk of infection.

The operation should be made in a hospital if possible. Nowadays no laparotomy is made in a private house if the patient can be transferred to a hospital. In cities or large towns there are hospitals with fairly well-equipped operating-rooms and attendants who understand to assist in major operations. In such places a patient requiring a Cæsarean section would always be sent to the hospital. The preparation for any laparotomy in a private house is still described in text-books on surgical and gynecological nursing, and reference must be made to the directions there given for the preparation for Cæsarean section should this ever be required in a house.

The preparation of the patient and the preparation for the operation is the same as that for any laparotomy. If she is not in labor and there is no urgency she is given a laxative and enema the day before the operation. The genital region is cleaned as has been described on page 135. Some obstetricians order a vaginal douche and perhaps a thorough scrubbing out of the vagina. If the latter is done, sterile cotton sponges soaked in lysol solution are used with the gloved fingers after the vaginal douche has been given.

The swabbing must be done very gently so as not to injure the vaginal mucous membrane. Ordinarily the vaginal cleaning, including douching, is omitted except in cases where labor has begun and the membranes ruptured, and especially where numerous internal examinations and delivery manipulations have been made. An antiseptic dressing is applied to the vulvar region, which must be cleaned again before the operation.

The abdomen is to be prepared as for any laparotomy according to the directions of the operator or the technic of the hospital in which the operation is made. Especial care must be used in cleaning the navel.

Three nurses are needed for the operation: 1 for the instruments and sponges, 1 for general assistance, and 1 for the baby. If there are enough nurses it may be better to have 1 nurse care for the sponges and another for the instruments. Both must be clean and wear gloves. The operator also requires 2 physicians as assistants, the first assistant who helps in the operation and the anesthetist.

Five minutes before the incision the patient should receive a hypodermic injection of pituitary extract. Another injection should be prepared for eventual use during the operation. Normal salt solution for hypodermoclysis should also be in readiness for use in case of shock or when much blood is lost.

For asphyxia of the child there should be a tank of oxygen, hot and cold water in long basins or infant bath tubs, a proper tongue holder, and, of course, the usual aspirating catheter, as well as clamp forceps and ligature for the cord.

The following instruments are required: 2 scalpels, 2 scissors, 16 short and 8 long artery forceps, 4 long forceps for sponge holders, 4 tenaculum forceps, 4 strong curved needles for sewing the uterine walls, 4 tissue forceps, 4 needles for the serous coat, 2 needles for the fascia in the abdominal wall, and 2 skin needles and 2 needle forceps. This list contains twice as many instruments as are really needed and makes provision for any emergency that might arise. There should also be strong No. 2 or No. 3 catgut for the uterine wall, No. 1 or No. 2 catgut for the peritoneum and

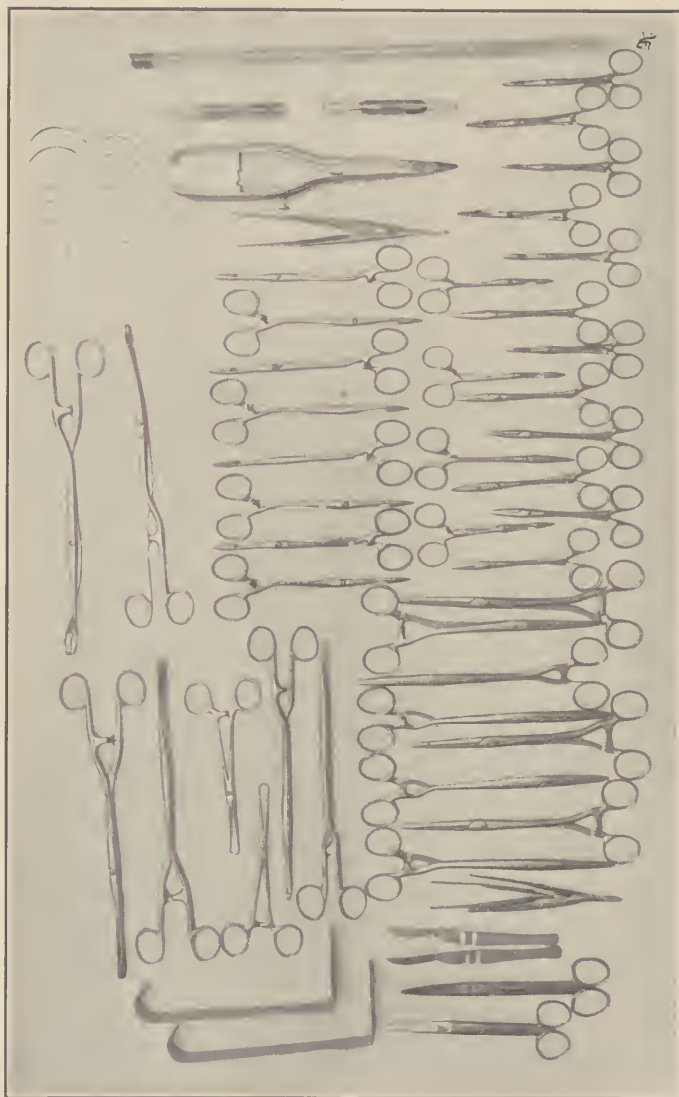


FIG. 86.—Instruments for Cesarean section.

fascia, silkworm gut for the skin, or horse-hair for the subcutaneous stitch if that is used.

Laparotomy sheets and towels, pads and sponges, dressings, etc., are, of course, provided by the hospital or the operator. If the nurse who cares for these is in doubt concerning the wishes of the operator regarding the preparation or counting of sponges or any other detail of the technic she must inform herself in advance.

Sometimes the uterus is eventrated before it is opened. This requires a long abdominal incision. After eventration the neck of the uterus does not fill the opening and the intestines tend to roll out behind the uterus. This is prevented by bringing together the edges of the incision with two or three tenaculum forceps. If the uterus is opened and the child extracted before eventration its body is then drawn outside for suturing and the superfluous opening behind closed with the tenaculum forceps as in the first case. The uterus is protected from the forceps and line of incision by a large towel or laparotomy sheet.

After the closure of the uterus the nurse must be prepared for any supplementary operation. The most common is the sterilization of the patient by removing the tubes. For this the operator requires a scalpel, scissors, and suturing outfit.

When the abdominal wound is closed dressings are applied and held in place with adhesive strips and a bandage. Subsequent control of the uterus is easier if the layer of dressings is not too thick. There will be considerable bloody discharge from the uterus and vaginal cavity if the operation has been done before labor begins. The vulvar region is to be cleaned and a large vulvar dressing applied as after delivery through the obstetrical canal.

The subsequent treatment is that appropriate to a laparotomy patient who is also a puerpera. She must be looked after carefully for twenty-four hours for vomiting, shock, hemorrhage, or pain. Thirst is relieved as soon as nausea permits. The bowels generally are moved on the third day with calomel, salines, oil, or a hypodermic injection of a physostigmine salt. The patient is encouraged to urinate

and catheterization is seldom necessary. The vulva is kept very clean and occlusion dressings constantly employed. The baby can be put to the breast the third day, from which time the course differs but little from that in a normal labor.

Porro-Cæsarean Section.—The operation just described is generally called conservative Cæsarean section, because the uterus is conserved or saved. If the uterus is already infected it is dangerous to try to preserve it, for the infection is hard to overcome and is likely to spread. Hence when the section of an infected uterus is necessary it generally is removed by amputation at the neck. Rarely uncontrollable hemorrhage after removal of the placenta may necessitate removal of the uterus in a case which was started as a conservative section. The amputation of the uterus in connection with a section is called the Porro operation, after the name of the Italian obstetrician who first performed it. The list of instruments already given will suffice for this operation.

Occasionally after the removal of the child the uterus is not amputated, but the entire organ is removed for infection or where there is cancer of the cervix. As the vagina must be opened it should be thoroughly disinfected beforehand.

Extraperitoneal Cæsarean Section.—Recently another operation, called extraperitoneal Cæsarean section, has been devised especially for unclean cases where section is indicated. The abdomen is opened low down, generally with a Pfannenstiël or transverse incision; the bladder is pushed to one side and the peritoneum pushed up so that space is obtained to open the cervix and lower part of the uterus below and outside of the peritoneum. In this way the possibly contaminated fruit water is prevented from entering the abdominal cavity. After the emptying of the uterus it is sewed up and likewise the abdominal wound. As the uterus is preserved the operation is a modification of the conservative Cæsarean section.

The preparation for the operation differs little from other sections. The patient is generally placed in the Trendelenburg posture, that is, with the hips elevated. A few ounces of normal salt solution are injected into the

bladder just before the operation begins to aid in its manipulation. Retractors are necessary to hold the edges of the wound apart and to displace the bladder while preparing the uterus for incision.

Suprasympyseal, Cervical, Transperitoneal Cæsarean Section.

—In this operation the incision into the uterus is also through the cervix and lower uterine segment, but no attempt is made to keep outside of the peritoneum. That is incised as in the usual classical section, but of course low down. This operation is now preferred by some obstetricians to the incision higher up for nearly all cases where Cæsarean section is indicated. Here as in the extraperitoneal section forceps are used in extracting the head.

Postmortem Cæsarean Section.—If the mother dies suddenly from any cause either during labor or in the last months of pregnancy the child may remain alive in the uterus for twenty minutes and can be saved if quickly removed by an abdominal section. This is called postmortem Cæsarean section. No instruments are needed except a scalpel and no previous preparation is required. Afterward the incision is closed by sutures.

Vaginal Cæsarean Section.—When the pelvis is large but the uterus closed, delivery may be effected by opening the uterus from below. This vaginal Cæsarean section may be indicated when the cervix cannot be dilated as in cancer of the cervix or when rapid delivery may be necessary on account of eclampsia or other maternal disease. It was stated on page 193 that in urgent cases the cervix could be opened with incisions provided it was effaced. Before effacement the incisions in the cervix are not sufficient. It is here necessary to carry the incision up some distance into the body. The bladder is separated from the anterior vaginal and uterine walls, and the latter is then incised as far as the peritoneal covering. This is then pushed up and the incision extended as far as may be necessary. In vaginal Cæsarean section the peritoneal cavity is not opened. The child is removed either with forceps or with turning and extraction. The closure of the wounds in the uterus, cervix, and vagina is made with catgut. Some begin repair in the

uterus before removing the placenta, while others remove the placenta at once after extracting the child and pack the uterus to prevent hemorrhage.

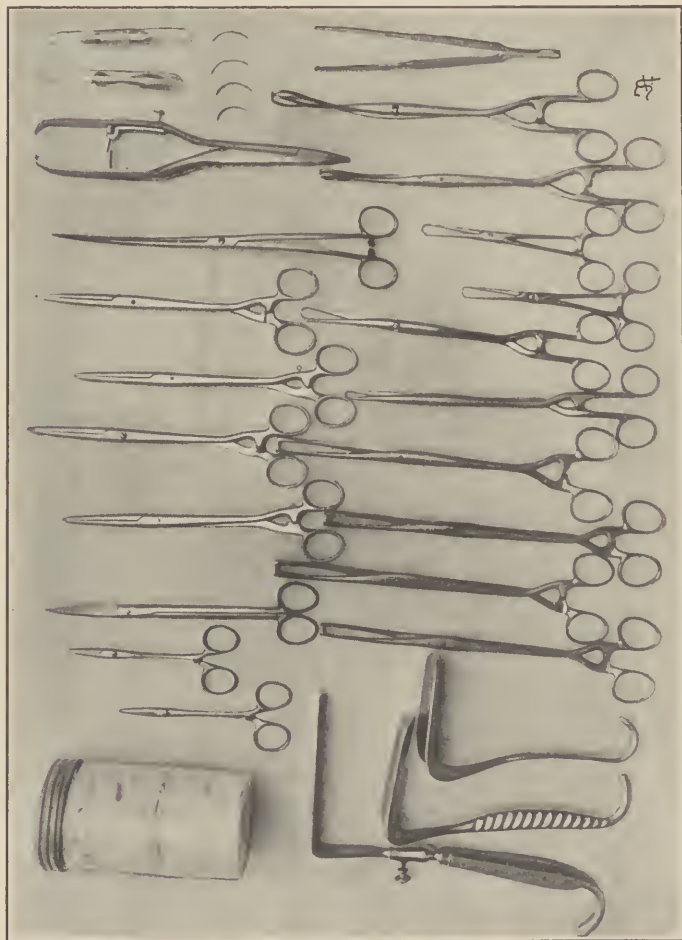


FIG. 87.—Instruments for vaginal Cesarean section.

The operation is made like most vaginal operations with the patient in the lithotomy position at the end of the table.

It is very important to have a good light that can be thrown into the vagina. Three nurses are necessary: 1 for the instruments, 1 for general assistance, and 1 for the baby. The operator also needs 3 physicians as assistants, 1 anesthetist, and 1 on each side to hold retractors and otherwise assist in the operation.

The preparation of the patient is the same as for an abdominal section. The abdomen should be cleaned, because the turning of the child will make it necessary to manipulate through the abdominal wall. The vagina must be well disinfected (page 204). The bladder and rectum must be empty. To protect the vagina from contamination from the anus a small towel may be fastened to the perineum and the buttocks by short tenaculum forceps or by sutures.

The following instruments are needed: 2 large vaginal retractors, 2 large narrow retractors for holding the bladder away from the cervix, 4 Doyen forceps, 4 tenaculum forceps, 2 sponge forceps, 4 long artery forceps, 1 long-handled scissors, 4 curved needles, 2 needle holders, twenty-day No. 2 catgut, obstetrical forceps, and also gauze for packing the uterus.

Some operators also use a uterine bag or metreurynter as an aid in pulling down the cervix and as a guide in incising the uterine wall.

Embryotomy.—Embryotomy means literally cutting up or cutting into the embryo. It is done for the purpose of making the fetus smaller so that it will pass through a contracted obstetrical canal. Sometimes both the head and the body are cut up. Much more frequently the head alone is cut open. This is called craniotomy. The perforation of the skull may be done with a pointed scissors-like instrument whose branches are sharp on the outside and cut when opened. A sharp-pointed instrument that is pushed or screwed into the skull may also be used. After the perforation a long tube or forceps is introduced into the skull cavity to break up the brain, which is pressed out of the opening as the head is compressed. After the perforation and consequent decrease in size of the head the delivery may be left to Nature. More frequently an instrument

which grasps and compresses the head is used to extract it. Such an instrument is the Braun cranioclast. One blade is introduced into the cranial cavity to the base of the skull and the other one on the outside of the skull or face. They are then brought forcibly together by a screw. A cephalotribe is a modified obstetrical forceps with strong blades to seize the head and crush it. The instrument most used nowadays was devised by the French obstetrician Auvard, and is a combination of these two instruments.

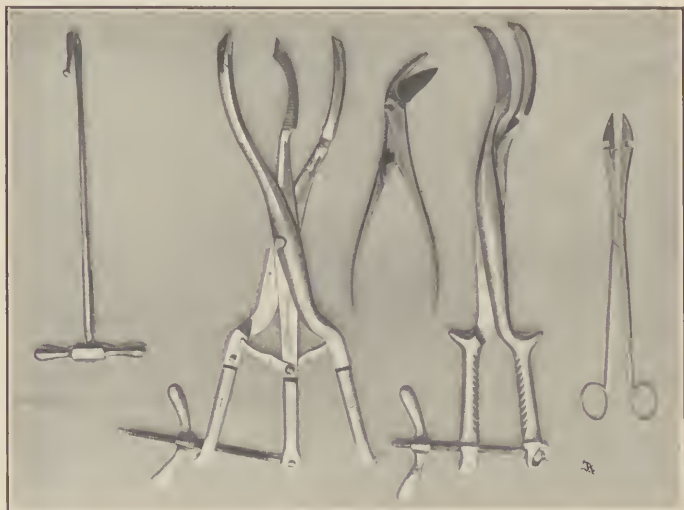


FIG. 88.—Embryotomy instruments: Braun hook; Auvard's cranioclast; cleidotomy scissors; Braun's cranioclast; Smellie's perforator.

It has three blades, the middle one of which is introduced into the skull cavity, a second, with which the inner blade forms a bone forceps like the cranioclast, and a third, which is applied to the opposite side of the head and forms with the second a cephalotribe. Generally the middle blade is sharpened to serve as a perforator. The operation of grasping the head with the cranioclast, which involves more or less compression or breaking up, is called cranioclasis. The operation with the cephalotribe is cephalotripsy. A basio-

tribe is a modified cranioclast or cephalotribe designed especially for crushing the base of the skull.

Craniotomy is indicated when there is a contracted pelvis and a dead child. The pelvis must not be too small else the child cannot be extracted even if the head is made smaller. We regard an antero-posterior diameter of the inlet of the pelvis of 6 cm. as the boundary line separating the indications for craniotomy and the absolute indication for Cæsarean section (see page 203). Formerly craniotomy was done even on a living child, but this operation is now almost entirely abandoned.

Rarely the craniotomy is done without an anesthetic if the vagina is not sensitive. Usually, however, the extraction follows the perforation, and anesthesia is desirable. The patient is in the lithotomy position on the end of a table prepared as for a forceps operation. The instruments required are the same as for forceps, with the exception of the perforator and cranioclast.

Decapitation.—Version is a dangerous operation in a neglected cross-presentation after the liquor amnii has drained away and the uterus firmly contracted around the child and fitted to it. It is apt to cause that most serious accident, rupture of the uterus. If the child is dead, decapitation is much safer for the mother. This is done with a Braun hook. Anesthesia is required and the same preparation as for forceps.

Removal of the Placenta.—The expression of the placenta has been described on page 172. The manual removal there alluded to is done only by the physician. No instruments are required, but the patient must be thoroughly anesthetized. The physician should wear a long gauntlet rubber glove to cover his forearm. The operation is generally done with the patient across the bed, but sometimes she is put on a table. An intra-uterine douche must be in readiness as well as the outfit for packing the uterus.

Repair Operations.—Tears of the cervix and the upper part of the vagina can be repaired satisfactorily only with the patient on a table and in a good light. Likewise extensive and deep tears of the perineum extending up into

the vagina or back into the rectum can be mended much better with the patient on a table. Slight superficial lacer-

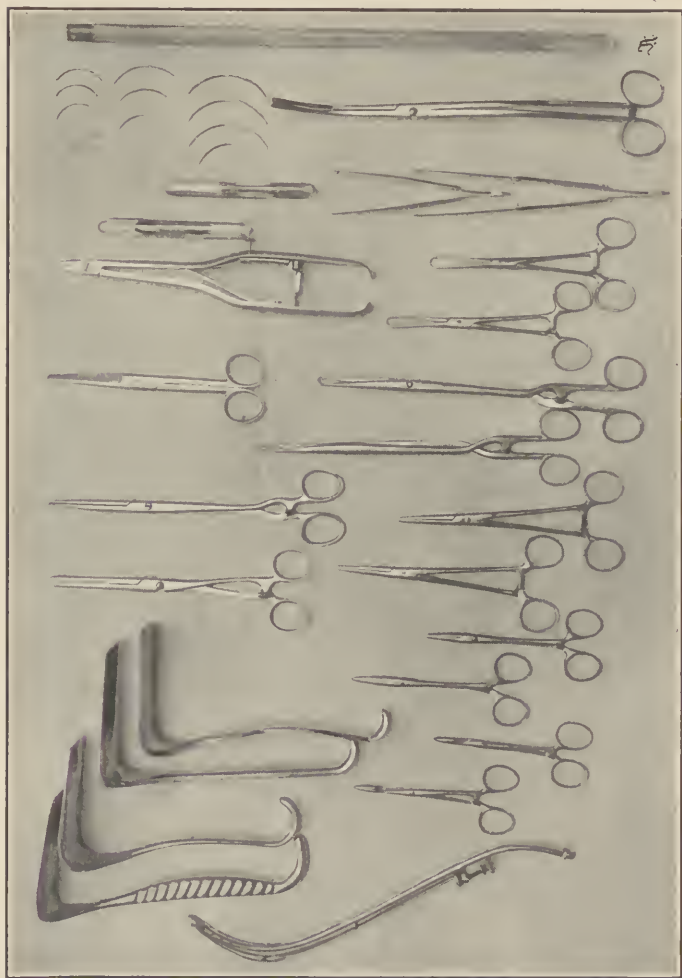


FIG. 89.—Repair instruments.

ations can be repaired with the patient in bed, her hips raised on a douche-pan, and frequently while waiting for the birth of the placenta (see page 187).

The repair instruments which should be in readiness after the labor in all primiparæ and whenever required in multiparæ are the following: 2, sometimes 4, vaginal retractors, 4 short and 2 long tenaculum forceps, 2 long and 2 short artery forceps, 1 dressing forceps, 4 medium curved needles for the vagina, 4 larger needles for the perineum, 1 needle forceps, No. 2 catgut 28 inches long, and several strands of silkworm gut.

For good work the physician needs 4 assistants: The anesthetist, a clean assistant to help with the retractors and sponges, and another clean assistant to care for instruments and sutures, and a general assistant to care for supplies, light, etc. Generally, however, the physician must be satisfied with an anesthetist and 1 nurse. The patient's legs are held with the sheet leg-holder, and the nurse stands at her right side and assists with the retractors. The instruments, sponges, etc., have been previously prepared and are placed on a table of sufficient size on the right of the operator. The nurse wears gloves while assisting with the instruments and removes them if she has to leave her post.

Instead of attempting a difficult repair with too few assistants and with insufficient preparation many obstetricians defer the operation for a few hours or even for a day or two until satisfactory assistants can be secured. Some even refuse to make any immediate repairs and wait for several days, when the patients are carefully examined and all injuries attended to. This course often reveals obscure injuries that would be overlooked immediately after labor.

Vaginal Douche.—The technic of the hot vaginal douche for postpartum hemorrhage has been described (see page 175). The cleansing, antiseptic, vaginal douche, intra-partum and postpartum, should begin with the patient on her back on a douche-pan or on a drainage sheet. Whether water alone or normal salt solution or some antiseptic solution be used the water should be sterile. A fountain syringe of rubber or enamelware should always be provided, and this should be sterile as well as the tubing and glass douche-point. The receptacle should not be too high and give too

great pressure. The quantity of water required depends upon the object of the douche, but generally 3 quarts is sufficient. The vulva must first be well cleaned and then the labia separated before introducing the tube. The nurse must remember that the direction of the vagina is backward and inward.

Intra-uterine Douche.—This is given only by the physician. If he employs it for postpartum hemorrhage he may use the usual vaginal douche-point because the cervix is still well dilated and there is no obstruction to the return of the fluid from the uterus. During the puerperium the douche may be employed in puerperal fever. As the cervix is now more or less closed he must provide for a return flow by using an intra-uterine douche-point, else the fluid might be forced out of the cavity of the uterus into or through the tubes. For the same reason he will not have the reservoir too high above the uterus. The patient must be on a table or possibly across the bed. He may get along without any instruments, but generally the nurse should prepare 2 vaginal retractors, 1 tenaculum forceps for catching the portio, dressing forceps and sponges, and a solution for cleaning the vagina and cervix.

Intra-uterine Tamponade.—The technic of the vaginal tamponade to prevent hemorrhage in placenta previa or abortion has been given (see page 92). The intra-uterine tamponade to control postpartum hemorrhage is used more freely by some physicians than by others. It is generally applied with the patient on her back across the bed, or better, on a table. As the operation is quite painful some physicians prefer to give an anesthetic. This reduces the shock of the operation, but also delays it. When the hemorrhage is severe and cannot be controlled with massage it may be necessary to pack immediately without ether in spite of the pain caused by the operation.

The instruments needed are 2 vaginal retractors or a large Neugebauer speculum, 2 tenaculum forceps for holding the cervix, a dressing forceps, and a scissors. A strip of sterile gauze, 9 to 18 inches wide and 8 to 13 yards long, is needed for the packing. The physician may have

prepared this beforehand and brought it with him in a sealed tube or jar. If not the nurse must cut off a strip of proper width from the 25-yard roll of gauze of the patient's outfit.

For the packing the obstetrician should have 2 nurses besides the anesthetist. One is at the side of the patient and holds the retractors or assists in holding the uterus while the other holds the jar of gauze and if necessary one of the retractors. A packing tube enables the operator to dispense with one nurse and at the same time introduces the gauze without the danger of contamination.

Hypodermoclysis.—The injection of a quantity of liquid under the skin is hypodermoclysis. The technic of the injection for hemorrhage has been described on page 179. It is also used to overcome shock. Generally, normal salt solution which is absorbed about as easily as blood-serum is the liquid chosen. To recapitulate here the rules for its administration it may be said: The needles must be large enough, the apparatus and solution must be sterile, the solution must be kept warm, it must never be injected into the breast but some distance below the breast or into the front of the thighs, and not more than 10 to 12 ounces should be injected into one place.

CHAPTER V.

CHILDBED, LYING-IN PERIOD, PUERPERIUM.

THESE terms are equivalent and are generally used to denote the period from the end of labor, that is, the birth of the placenta to the completion of the change in the genital organs when they resume a condition normal for a woman who has born children.

Duration.—There is some difficulty in defining the duration of childbed. If the term were used literally to denote the length of time that the patient remained in bed we should find that its duration varied greatly according to the social condition of the patient, the custom of the time and place, the ideas of the attending physician, etc. In some cases it would last four or five weeks, more frequently nine to twelve days, often only two or three days, while in the case of the North American Indian female there is, literally speaking, no childbed, for it is not her custom any more than that of animals to lie down after labor. If we should take the presence of the discharge or lochia as the measure of the duration of childbed we should also have some confusion. Although frequently the discharge ceases in about two weeks, still it frequently continues longer and often returns after the patient gets out of bed. Moreover it may run into a more or less permanent leucorrhea. It is therefore best to make the limit of the puerperium coincide with the resumption of the normal condition of the genital organs. After labor the uterus, its appendages, and the abdominal wall all begin to decrease in size. This process is called involution. It comes on with varying degrees of rapidity, but in ordinary normal cases it is completed in from six to twelve weeks; hence this may be considered the duration of the lying-in period. As a rule it is only during the first third or half of this period that the patient is under the care of the nurse and

physician. Yet the resumption by the patient of all of her household or social duties before the completion of this period may lead to incomplete involution with unpleasant and lasting complications.

Lochia.—The discharge from the genitals during child-bed is called the lochia. For a day or two it is frequently composed mostly of blood, although it would not be proper to include under this term a severe bleeding or hemorrhage after labor. It comes chiefly from the uterus and may be considered a wound discharge. Besides the bleeding from the opened and injured vessels it is also due to desquamatory changes in the placental region and in the decidua, the transformed mucous membrane of the uterus. The discharge gradually becomes lighter in color, containing less and less blood until after seven to fourteen days it may be only a slimy or partly purulent discharge, which continues for a few days longer and then ceases. It may disappear for a few days to reappear when the patient sits up or moves around much or because of a displacement of the uterus or from some unknown cause. It may be difficult to distinguish such a reappearance of the lochial discharge from menstruation. The quantity and duration of the lochia varies greatly in different women and also depends upon the character of the labor and other causes. It frequently has a peculiar and somewhat disagreeable odor due to decomposition caused by bacteria. If all bacteria in the vagina and on the vulva were destroyed during labor and kept away from the genital outlet afterward all odor would be prevented. This peculiar smelling lochia is not very dangerous, but as a sign of contamination it should be prevented as much as possible by care in the genital dressings. A more offensive lochia due to the colon bacteria and sometimes to other germs may indicate a more dangerous contamination. The presence and character of any odor as well as the color, nature, and quantity of the lochia, should always be carefully entered on the history sheet. The stoppage of the lochia indicates lack of drainage from the uterus and is not uncommon in cases of infection of the uterus; hence it should be watched for and reported.

Care of Bed, Cleaning of Patient, and Care of Genitals.—As was said in the preceding chapter the contraction of the uterus should be carefully observed for several hours by examining frequently with the hand through the abdominal wall, and if it is found to contract poorly, sometimes becoming large and soft, while at the same time considerable blood escapes from the vagina, it should be stimulated to continued contraction by rubbing through the wall of the abdomen and by other measures before referred to. In cases of postpartum hemorrhage the change of the bed and dressing of the patient is deferred until the bleeding is stopped. When the vagina or perineum is torn the application of the dressing is also delayed until the lacerations are repaired. In normal cases, however, as soon as the after-birth is expelled the patient may be cleaned and the bed changed. If the draw-sheet or pad under the patient is much soiled it is rolled together and removed and a clean sheet underlaid. Then all blood-spots are washed off from her body, if necessary her night-dress is changed, and then the douche- or bed-pan is put under her and the external genitals thoroughly cleaned from clots with soap and sterile water and later bathed with sublimate or lysol solution. A large, thick napkin is then applied, the sheet with the rubber draw-sheet removed and a clean draw-sheet put under her, when the change from the labor-bed to the bed of the lying-in period is complete.

The abdominal bandage may now be applied and the napkin fastened. Some physicians object to this bandage. If it is so applied that it can roll up and make a kind of cord around the middle of the body it becomes uncomfortable and useless. If it remains on too long and becomes soiled with the discharge it becomes dangerous. But if properly applied it relieves the patient from the unpleasant feeling caused by the change in the pressure within the abdomen, prevents the tendency to displacement of the abdominal organs, especially if they have been previously prolapsed, and perhaps aids the patient in regaining a good shape. The bandage should be changed at least every day and as often as it becomes at all soiled. It should be made of strong cotton cloth, long enough to reach around the

body and lap sufficiently to pin, and wide enough to reach from below the trochanters or upper projecting parts of the thighs to within 1 inch of the lower end of the sternum, that is, about 12 inches. The 4 yards of cotton cloth furnished in the obstetrical outfit is sufficient for 8 bandages, part of which may be used for breast bandages if desired. The abdominal bandage should be fastened in front with a sufficiently large number of safety pins to hold it smooth



FIG. 90.—Abdominal and breast bandage and vulvar dressing.

and well in place. The lower edge is drawn so tightly that it will not slip up over the trochanters.

To this bandage, made and applied as described above, the vulvar dressing is fastened at each end so that it makes a fairly good occlusion bandage. The essential point is to make the ends of the dressing wide and fasten them firmly at the corners so that they fit well in the groins in front and against the sides of the back behind. In this way the discharge cannot run out between the thighs and abdomen

along the groin as soon as the patient turns on her side, as generally happens if the dressing is fastened only in the middle or held in place with the ordinary T-bandage.

The T-bandage is unsatisfactory not only because it does not hold the napkin well in place, but also because the piece which goes between the thighs is soon soiled and cannot be discarded without the whole bandage.

The frequency with which the napkin should be changed depends upon the amount of discharge. The rule is to never let the napkin become saturated. When this occurs it forms a good soil for bacteria, which quickly penetrate to the vulva. As a rule the napkin must be changed every half to two hours for three or four times after labor, then for two days every three hours, and afterward every four to six hours, or as often as the patient passes urine or feces. Whenever a fresh napkin is applied the clean douche-pan should be put under the patient and the nurse with clean hands should wash off all traces of discharge from the whole genital region from the pubes to the anus, using plenty of warm water and soap. For washing she may have a basin of water and cotton or gauze sponges placed close to the douche-pan. Instead of sponging the parts for simple washing the vulvar or external douche may be employed. The water or solution in a pitcher is poured over the genital region until all discharge is washed away and then the labia are separated by the thumb and finger of the left hand and the vestibule thoroughly washed with the remainder of the liquid. Instead of the pitcher the irrigator may be used. If the patient has had a bowel movement she should be sponged. It is important that the anal region should be thoroughly washed first, and care should always be taken not to rub upward, that is from the anus toward the vulva. Of course the sponge that comes in contact with the anal region should not be used in washing around the vulva. After the cleansing with soap and water the genital region is washed with a disinfectant solution, sublimate 1 to 2000, carbolic acid 1 to 2 per cent, lysol 1 per cent, according to the direction of the attending physician. Then the fresh napkin is applied.

Not only must the napkin be changed as often as it becomes

soiled, but the bedclothes as well. The draw-sheet or pad which can be easily changed should protect the lower sheet. The bed covering should be light and comfortable. The comfort of the patient depends much upon the care of the bed, which must be well made morning and night and constantly kept smooth and clean.

Cared for in this way the chances are that the lochia will be free from odor, any repaired laceration will heal without any trouble, and no trace of fever be present.

Formerly the vaginal douche was considered necessary in all cases to remove germs that might remain in the vagina after labor or to remove the lochia which was thought to be poisonous. Now it is pretty generally abandoned because of the danger that attends its routine use when by any lack of care healing wounds may be broken open and germs carried into the vagina from outside. Moreover it has been found to interfere with the power of cleansing itself which the vagina possesses. Hence it should never be given by a nurse unless it is ordered by the physician. It may be required when there is offensive lochia, for hemorrhage, or in cases of delayed involution of the uterus. For offensive lochia a cleansing douche generally of sterile water or a mild disinfectant solution at a temperature of about 100° F. is given two to four times a day. In the third or fourth week of childbed a large, flabby uterus may be stimulated to contract and undergo the involution changes by a douche as hot as can be borne.

An intra-uterine injection is sometimes used in cases of postpartum hemorrhage, and also occasionally in cases of infection of the uterus. It is a rather serious procedure and should always be given by the physician. Should he ever entrust this to a nurse he would give her special directions in the method of its performance.

Puerperal Fever or Genital Wound Infection.—In all cases of labor in primiparæ and frequently in multiparæ some abrasions, if not tears, of greater or less extent, occur about the vulva and in the vagina and cervix. Moreover, the inside of the womb is practically a large raw or wound surface. These wounds, like wounds in other parts of the

body, become infected when infectious matter, that is, matter containing bacteria, comes in contact with them. Before labor the germs may have been present in the vagina or on the skin about the vulva and rectum. They may have been brought to the wound by the hands of the patient, nurse, or physician before, during, or after labor. The wound may likewise have been infected by soiled napkins, clothes, or bedclothes. The bed of the patient may have been contaminated by a dirty bed-pan or by the soiled clothes of physician, nurse, or relatives of patient if they have sat on the bed. Impure water used to wash the wound may likewise be the source of infection; likewise a contaminated douche. These sources of infection have been referred to when describing the preparation for labor. The air, which is so frequently accused as a source of infection, is probably very rarely the cause of trouble, and the elaborate precautions sometimes advised, such as stopping up the pipes of stationary washbowls, etc., are quite needless and superfluous.

The severity of the infection depends upon the amount or extent of the infection, the nature of the infection, that is, the kind of infecting bacteria, and the resistance of the patient to the invasion of the germs. The most common infecting germs are the streptococci, or chain bacteria, similar to those which cause erysipelas; staphylococci, or bacteria which grow in clusters like those which commonly cause boils; gonococci, or those which cause gonorrhea; colon bacteria, that is, those which live in the colon, which cause disease when growing in wounds; the Klebs-Löffler bacilli, which cause diphtheria; and various germs which cause decomposition of dead matter. When only a few germs obtain access to a wound, or when the germs are not very virulent, or when the resistance of the tissues of the body is great, the germs may grow only a short time before they are killed and thrown off from the body. When the germs are present in great numbers, or more virulent in character, or the tissues less resistant, the infection may spread superficially or penetrate deeply, causing severe local and general disturbance. The method of extension of the infection differs according to the character of the bacteria; for example,

streptococci penetrate deeply into the tissues, while gonococci spread over the surface, perhaps from the vulva into the vagina, through the uterus, into the tubes. The germs thus cause both local and general disturbance.

Symptoms.—The local symptoms are heat, swelling, and tenderness of the region infected, together with more or less discharge which may or may not have an offensive odor. If the infection is quite circumscribed there may be so little trouble that the patient may remain quite unconscious of it. Sometimes the discharge is the chief symptom, but it may be confounded with the lochia and so pass unnoticed. Hence it is important that the nurse examine carefully and record on the history sheet the character of the lochia. There may be present one or more inflamed patches in the vulva or vagina which frequently become covered with a pseudo- or false diphtheritic membrane, and hence are called diphtheritic or puerperal ulcers.

When the infection invades the uterine cavity we have an endometritis or metritis, generally attended with uterine tenderness. In these cases the infection is sometimes chiefly in the clots which close the vessels of the placental site. When these infected clots break down particles may get into the blood stream and be carried to different parts of the body. Here they may lodge in any of the organs, like the liver, and kidneys, and abscesses will be formed. This condition is called septicemia, septic matter in the blood, or pyemia, pus in the blood. Bacteremia is a more general term, that denotes bacteria in the blood and may occur without septicemia. The entrance of septic matter into the blood is attended with chills.

If the infection penetrates into the tissues surrounding the uterus it may cause a large amount of serous or purulent matter to be poured out, causing tenderness and resulting in abscess or lasting pelvic disease. If the infection penetrates through the uterus and surrounding tissues to the peritoneum, or if it spreads through the tubes to this membrane, it causes either a local peritonitis limited to the membranes affected shown by local pain, or perhaps a general peritonitis shown by a general distention of the abdomen and much pain,

with all the other serious symptoms accompanying this condition.

When the infection is carried to the thigh and leg and deposited in the large lymphatics and veins of the inside of the upper part of the thigh it causes a swelling or edema of the limb which is in consequence very pale and is called "white leg" or "swelled leg." This condition has also been called "milk leg," because from its milky appearance it was supposed to be due to the milk that left the breast. In this condition the milk frequently dries up because of the fever and general infection. The Latin name for this condition is *phlegmasia alba dolens*.

Besides the disturbance caused by the bacteria themselves, either when they remain confined to certain localities or when disseminated throughout the body, there are other symptoms caused by the distribution through the body of poisons generated by the growing bacteria. We may suppose that as bacteria grow they produce a very deadly poison which readily passes into the bloodvessels and is carried to the brain as well as to all other tissues of the body. The amount of these poisons depends upon the extent of the infection, that is, the number of bacteria. In bacteremia, for example, the amount of poison produced might be very great. Their effects depend largely upon the kind of infection. For example, the poisons produced by the gonococci are much less serious than those produced by the streptococci. The circulation of these poisons gives rise to what we call the general symptoms of an infection, viz., chill, fever, rapid pulse, vomiting, loss of appetite, sometimes diarrhea, delirium, etc. It will be necessary to study these symptoms somewhat in detail.

A chill may be of all degrees of severity, from a slight feeling of coldness to a severe shivering or shaking of the whole body. The temperature may be normal or subnormal at the time of the chill, but generally rises shortly afterward, or it may be high at the time. As a sign of infection it is important and should lead the nurse to take the temperature frequently after it.

It is, however, important to know that a chill immediately

following labor is a not infrequent occurrence, generally does not indicate any infection, and ordinarily need not occasion any anxiety. It is controlled by covering the patient warmly and giving her a hot drink.

Fever is one of the most important symptoms of an infection and is generally taken as an index of its severity, and, as we know, gives the name to the diseased condition, viz., puerperal fever. It is first necessary to define what is meant by fever. For practical purposes we have to draw an arbitrary line. We say that a temperature over 100° F. is fever. In this way we allow for slight variations in the temperature of the body due to local rises in temperature, for example, such as result from the severe muscular exertion of labor. We assume what is almost always true, that a temperature of over 100° means an infection. Rise in temperature is often ascribed to worry or fright, but generally without reason. Also the common idea that the establishment of the milk secretion is attended with fever is contrary to the results of investigation. Hence we may confidently assume that fever after labor is due to some infection, either in the genital tract or the breasts, or in some organ not connected with the child-bearing process, like the throat, lungs, etc.

Since increased temperature is an important symptom it is of greatest consequence that the physician may be able to rely absolutely upon the record made by the nurse. Therefore it is her duty to know that her thermometer is correct, that it is properly held by the patient, that the temperature is taken as often as necessary, and that it is correctly recorded.

There are numerous variations in childbed fever corresponding to the differences in the infectious process, and temporary fever lasting from a few hours to two or three days is due to a limited infection which generally leaves behind little or no traces. The height of the fever determines the amount of intoxication by the bacterial poisons. If the fever is associated with an offensive discharge it denotes the presence of germs of decomposition and the condition is not as dangerous as in the case of a similar fever where the lochia has no odor. A long-continued fever without peritonitis often denotes the presence of the infectious process around

the uterus. All of the meanings of fever are learned only by much study.

Next in importance to the study of the body temperature is that of the pulse. Immediately after labor the pulse is often uncommonly slow. A pulse rate of 55 to 60 is not uncommon and sometimes as low as 45 to 50. The slow pulse rate may continue two or three days. The cause of this singular phenomenon is not certainly determined. Like the chill initiating the puerperium it has no pathological importance.

Immediately after labor a rapid, weak pulse leads to the suspicion of hemorrhage, which should be carefully watched for. Later in childbed, fever is associated with a rapid pulse. The two symptoms, however, do not always go hand in hand. In the worst cases of puerperal sepsis the fever may be low, while the fast, soft pulse warns us of the seriousness of the danger.

The other general symptoms already mentioned, headache, loss of appetite, vomiting, etc., need not be further considered, for they do not differ essentially from the same symptoms in other diseases of an infectious nature.

Treatment.—In the treatment of puerperal fever, while the physician is responsible for the general management, the nursing is very important. Some physicians lay more weight upon the local treatment and some believe in a general symptomatic treatment, that is, they support the patient while Nature cures.

Direct local treatment of a case, so far as the nurse is concerned, means generally vaginal douches. These are used especially when there is any odor to the discharge and when there are vaginal ulcers. The manner of giving such douches has been described already. In caring for a patient it is well for the nurse to keep constantly in mind the poisonous nature of the discharge and avoid as far as possible contaminating with it her hands or clothing. When the hands become soiled they should be at once disinfected before the contamination has lasted long and before the hands have come in contact with other parts of the body and the clothing. Here is a place where the nurse should

wear gloves, not to protect the patient but to protect herself. It would be well also for her to protect her clothing when she is caring for the patient by wearing a large apron. The vulvar dressing should be burned and the patient's garments and bed-linen should be kept, until boiled, in a large bag separate from other wash. The excretions should be disposed of at once, the bed-pan boiled or sterilized with a strong antiseptic solution (1 to 500 sublimate solution).

If a nurse is in a hospital and has care of a fever case while she is obliged to attend clean patients she must carry out these rules with the utmost thoroughness to prevent contamination. Not only must she have for the fever patient gloves and apron which are left in the patient's room, but also she should wear gloves while waiting on other patients. It is much better that fever patients be separated from clean cases, and cared for by nurses that have nothing else to do.

In the general or symptomatic treatment the most important indication is to relieve pain. For the relief of local pain in peritonitis, in milk-leg, etc., the warm, moist dressing is very valuable. This dressing consists of a wet cloth like a folded towel wrung out of warm water, covered with an impermeable material like oil-silk or rubber-cloth, and kept warm by placing over the whole a hot-water bag filled about one-quarter full with hot water. A swelled leg should be lifted on pillows or blankets and bandaged with cotton, with the moist dressings applied over the groin and inside of the thigh. An ice-bag or ice-water coil has much the same soothing effect and is frequently to be preferred.

The distention of the bowels with gas, or tympany, is a cause of much pain and disturbance to the heart and respiration. It can be relieved sometimes by medicine and frequently better by large enemata as described on page 73.

High temperature in cases of puerperal fever is best controlled with a sponge-bath and with an ice-bag to the head. The various excretions of the body should be kept free. The kidney excretion is favored by the use of large quantities of liquid given by the mouth and by salt solution enemata. The bowel excretions are favored by the use of salines and enemata. The skin is kept in good condition by free bathing.

The strength is kept up by attention to the feeding and by the careful conservation of all the body energy. The diet must consist of water, plain or carbonated; milk; easily digested food given with regularity at proper intervals. Often the patient is not hungry and would go for days without asking for food. Careful observation must determine what quantity of food the patient can take and digest and what is the proper interval for feeding. In the preservation of the strength of the patient we must not only avoid all loss of energy by any unnecessary exertion, but also the loss of heat which follows exposure.

If the fever is high or lasts more than a day or two, lactation must be suspended. Generally the secretion of milk will be lessened and its quality impaired so that it will not be suitable for the baby. Moreover, the strength of the mother, which must be conserved, is affected by nursing. She may be told that she will not lose her milk or that it will return as soon as the fever leaves.

Puerperal Tetanus.—A special form of puerperal infection is puerperal lockjaw or tetanus. Like all forms of tetanus it is due to a special kind of bacterium that is often found on the ground or floor. The germ is especially found around horses and some other domestic animals. Cases of puerperal tetanus have been ascribed to the introduction of unclean ice or snow into the uterus to stop hemorrhage. It might be produced by the use of dirty cloths for napkins, or by a dirty douche-point. The treatment is that of tetanus from any other source and cannot be given here.

Puerperal Insanity.—Another rare puerperal disturbance may be mentioned here, namely, puerperal insanity. It is occasionally the result of infection, but according to our present knowledge is also due to a variety of other causes, the chief of which is exhaustion following a severe labor in a weakened anemic person. The insanity generally takes the form of an acute mania, sometimes a melancholia. The attendants are generally forewarned of an outbreak by the unnatural, moody behavior of the patient. The management of the case consists chiefly in care and watchfulness to prevent the patient from injuring herself and others, and

nourishment and attention to general health. The baby should be taken from the breast and removed from the presence of the patient as soon as the condition is discovered. A large majority of the cases recover if managed properly, but the condition may last many weeks or months.

Difficult Micturition.—After labor patients frequently have difficulty in micturition, that is, in passing urine. This difficulty is due generally to injuries to the urethra and base of the bladder during labor, with subsequent swelling and spasm of the bladder. It is likewise increased by the fact that the patient must urinate while lying on her back—an unusual position for her. Overdistention of the bladder, always to be avoided, is particularly harmful after labor. It may lead to a long-continued paralysis of the bladder muscle or to injury of the mucous membrane of the bladder, a condition which predisposes to infection. It also interferes with contractions of the uterus and thus favors postpartum hemorrhage. Hence the nurse should be on the watch for an overfilled bladder, especially as the patient is frequently unconscious of it. Sometimes a little urine overflows from a distended bladder deceiving both patient and nurse. With a little practice this condition can be determined by examining with the hands and finding a soft mass above the pubis in front of the hard, contracted uterus. The uterus is frequently to one side and the bladder to the other side. Should there be any doubt whether a swelling in this location is bladder or bowel, percussion would easily show the difference between the dull sound of the bladder and the sound produced by a distended intestine. Sometimes the bladder fills very rapidly after labor, and in the course of three or four hours extends nearly to the navel. Perhaps the patient did not pass her urine for some time before the child was born. In such cases the bladder should be emptied as soon as the condition is discovered, otherwise the patient may wait eight to ten hours. Rarely should the nurse delay longer than twelve hours after labor and then only if she be quite certain that the bladder is not overfull.

It is always better for a patient to pass her urine than to have it drawn with a catheter. When a laceration has

occurred, fear is sometimes expressed that urine flowing over the sutured wound may interfere with the healing. This fear is due to the not uncommon but erroneous idea that urine is in some way very poisonous. Urine from a healthy bladder is quite sterile and of course can cause no infection. It is not particularly irritating, and if the parts are washed off, as they should be immediately after urination or even during urination not the slightest harm can be done.

If the patient cannot urinate while lying on the bed-pan she may sometimes be helped by pressing with the hand over the bladder or by such well-known expedients as using hot fomentations over the pubes, hot water in the bed-pan, letting water run from a faucet and from a pitcher. Sometimes a patient can urinate after an enema while emptying the bowel. All these measures, however, are often futile, and then it may be necessary for the patient to rise to the sitting posture. It will be found that the easiest position for the patient is when she is kneeling with the chamber-pot between the knees and legs. She throws one arm over the shoulder of the nurse, who sits partly behind her and supports her with an arm around her body. As this is the position that the patient may have to take when her bowels move, it is desirable that the nurse know exactly how to bring her patient into this attitude easily and support her securely.

Of course if the patient is very weak from any cause, and particularly if she has lost much blood, this treatment would not be employed. In normal cases, however, no harm will result. Some physicians prefer to have the patient get out of bed. Many might object, however, to having a patient sit up, and therefore it would be well in case the nurse does not know the ideas of the attending physician in this regard to ask him whether she shall catheterize the patient, in case micturition is impossible, in the horizontal position or if the sitting posture should be tried.

When for any reason it is not desirable that the patient should be raised from the horizontal position or when she cannot urinate even sitting it becomes necessary to catheter-

ize her. Here the nurse is obliged to assume a grave responsibility. The great majority of cases of cystitis or inflammation of the bladder have been caused by the catheter. There are two dangers in catheterization: (1) Injuring the bladder wall, and (2) carrying infectious germs into the bladder. By the careful use of a smooth-glass catheter, which is the only kind to be employed by a nurse, there is not much danger of a severe injury to the bladder; yet it may often happen that a contraction of the neck of the bladder upon the introduction or the withdrawal of the instrument may cause some injury to this region in spite of the best technic. Undoubtedly the great danger is that of infection. Even if the catheter is made absolutely sterile by boiling, which should always be done, the frequent presence of large numbers of bacteria around the mouth of the urethra, often penetrating a third of an inch into the canal, makes it very hard to avoid carrying them into the bladder. The following rules should be strictly followed: (1) Disinfect the hands; (2) boil the catheter; (3) disinfect the genital region as already described, using the irrigator and having the patient in a good light; (4) separate the small lips with one hand so that the mouth of the urethra is clearly seen, and with the other hand thoroughly douche the vestibule with quantities of sterile water, directing the stream so as to wash out the mouth of the canal; (5) substitute for the irrigator-point the catheter, insert it into the urethra about a third of an inch and let the water run for a minute, then leaving the catheter in the urethra, disconnect the tube and push the catheter into the bladder (no lubricant is required); (6) when the urine ceases to flow in a stream, without waiting until the last drop is expelled, remove the catheter and once more wash off the vulva with the irrigator. Where the irrigator is not used the vestibule and mouth of the urethra are cleaned with sponges, after which the catheter is introduced without using it first as a douche-point to wash out the bacteria from the urethra.

Frequently one catheterization is all that is required, the patient being able to empty the bladder afterward. If the catheter must be used for several days the danger of infection

is much increased, because it is very natural for the nurse to relax in her efforts. Conscientious thoroughness is here of great importance.

The nurse was formerly taught to catheterize "by the touch" or "under the sheet." The mouth of the urethra was found through the sense of touch by the fingers of one hand and the catheter, held in the other hand, pushed into the bladder. It was considered a great feat and almost a test of a good obstetrical nurse to be able to find the right opening and carry the catheter into it without first pushing it into the vagina or perhaps the rectum. The false modesty that dictated this foolish practice has now been driven away by the general spread of the knowledge of germ diseases, and the practice is only mentioned to be condemned.

For the first week the quantity of urine passed by the patient should be estimated or measured and recorded on the history sheet.

Constipation.—The majority of women in childbed are constipated. The chief factors that bring this about are fecal retention during pregnancy, the causes of which are discussed in Chapter III, the frequent lack of coarse food in the diet, the absence of exercise, the horizontal position of the patient, and the lax abdominal walls. The degree in obstinacy of the constipation varies much with different patients. Sometimes a regulation of the diet, a dose of salts, an ounce of liquid petrolatum, or a simple enema are all the measures that are required. In other cases of long-continued constipation with large accumulations in the intestine, the management of the bowels may be the most difficult part of the nurse's duty in the care of the case. The patient should have an evacuation of the bowels every day. For the guidance of the physician the nurse should always report fully not only the number of bowel movements but also their character, the amount of difficulty experienced in defecation, and also between the bowel movements the amount of gas in the bowel and the amount of discomfort arising from it.

The measures employed by the nurse to relieve constipation and its attendant discomforts are massage and enemata.

In performing massage it is necessary to remember the course of the large bowel. Starting in the lower part of the abdomen near the middle of the right groin, it passes up to the liver under the ribs as the ascending colon, crosses to the left side as the transverse colon, and descends to the left groin as the descending colon, terminating in the sigmoid flexure, which ends within the pelvis in the rectum. In the lax condition of the abdominal walls after labor it is reached more readily than at any other time. Much of it is covered by the small bowel, especially where the latter is at all distended with gas. The portions of the large bowel most readily accessible are the beginning of the ascending colon, the middle of the transverse colon, and the lower part of the descending colon. Massage acts in two ways: (1) The contents of the bowel, liquid or solid, are moved along mechanically, and (2) the worm-like or peristaltic movements of the intestine are stimulated. When massage is combined with an enema the liquid is first carried backward to the beginning of the colon by the reversed movement and then forced out again. By keeping in mind the location of the colon and the object of massage an intelligent nurse with a little practice can do fairly well even without special training in the technic. The manipulations which are executed over the accessible portions of the colon may be made with the ball of the thumb or the outer side of the hand or with the fingers, the skin moving with the hands. Pressing over the abdomen with the hand during defecation may also be of value in forcing along the contents of the colon.

The enemata employed in childbed are of various kinds. The amount may vary from 1 dram to 3 quarts. Plain water or glycerin or oil may be used, and also various water solutions of common salt, Epsom salts, soap, turpentine, glycerin, etc. The injection may be cold, tepid, or warm. Injections of 1 to 4 drams of glycerin or glycerin and water may be given with a small glass or hard-rubber or piston syringe; larger amounts are generally given with the fountain syringe. The rectal point, whether of glass or of hard rubber, should be smooth and clean. An old, cracked, hard-rubber point or one with a rough end might cause an abrasion of the

mucous membrane while being pushed, perhaps roughly, through the sphincter ani and lead to an infection or an obstinate wound. For this reason some prefer to use always a soft-rubber tube that has two opposite, smooth side-openings or eyes about 1 inch behind the somewhat blunt, taper-pointed end. It should be coated with a clean lubricant.

The amount, kind, and temperature of the injection should be specified by the physician. If a patient suffers with considerable gaseous distention of the bowels an injection of 1 ounce of glycerin, 1 ounce of magnesium sulphate, and 4 to 6 ounces of water is frequently ordered.

Sometimes the rectum and sigmoid flexure are stopped up with an impacted mass of feces that cannot be washed out with an injection. Here it will be necessary to insert the finger, well lubricated and protected with a glove, and break up the mass little by little, using the irrigator with soap solution, from time to time, to wash away the loosened particles.

When there is an accumulation in the colon the so-called colonic washing or lavage is indicated. This may be given in the following way: The bed being protected with rubber sheets and pads and the bed-pan being at hand, the pelvis is raised so that water may run into the bowel by lifting the foot of the bed. Normal salt solution 1 level teaspoonful to a pint of water, or a soap solution, both at a temperature of about 70° F., is used. The end of a large soft-rubber tube, about No. 30 of the French scale, connected with the irrigator, elevated 1 or 2 feet above the patient, is introduced 3 or 4 inches into the rectum and the water allowed to run. No attempt should be made to carry the tube into that portion of the bowel that lies above the promontory or inlet of the pelvis. The tube will simply coil around in the gut. When the patient begins to feel uncomfortable the flow is stopped, the rectal tube disconnected and allowed to empty into the bed-pan; then this procedure is repeated four or five times. Not all of the water returns through the tube each time the rectum is emptied, but some of it remains in the colon, and finally a sufficient quantity has passed to stimulate thoroughly the peristalsis and effect a good evacuation. If this

washing is repeated once or twice a day for several times the entire colon will be well emptied without the disturbance caused by the use of the usual large tepid enema.

Diet.—As a rule the physician gives directions concerning the diet of the patient in childbed. As in so many other questions not obstetrical, there also exist here antiquated and unfounded notions, so that it is desirable for the nurse to know the principles of dietetics in order that she may be able to assume safely whatever responsibility is thrown upon her.

There are prevalent two common erroneous ideas concerning the diet of women in childbed: One is that hearty food, especially meat, etc., will cause fever. There is, of course, absolutely no basis for this notion. The cause of fever is infection from some source, in the great majority of cases from genital wounds or from breast wounds. Indigestible food, like salads or pickles, may distress the stomach and make the patient uncomfortable, but only in that way can the food harm her.

The other common error is that very many foods injure the milk secretion and harm the nursing infant. Particularly are sour substances like fruit thought to be harmful. About all the exact observations that have been made on this subject, however, tend to discredit this popular notion. Even pickles and salads, which may be harmful because they produce indigestion, have no effect on the demonstrable chemical composition of the milk nor on the nursing child.

Hence the problem of feeding the mother does not differ from that of feeding any other individual under similar conditions. Food is for the purpose of replacing the outgo of the body, including both the waste and the secretions and creating heat and motion. The outgo from a woman in childbed includes the loss from the ordinary excretions and also from the hemorrhage, lochia, and the breast. During labor a woman loses in the child, fruit-water, blood, and perspiration one-tenth of her weight. Generally she cannot take much food and the energy consumed by severe muscular exertion and pain is lost. Within one week after labor she loses about one-half as much more in the lochia and excretions.

Hence we see the necessity for a liberal diet. Moreover she must supply from 1 to 3 pints of milk a day. On the other hand she has no great waste of heat, for she is covered in bed and there is very little expenditure of energy in motion. The conclusion drawn from these facts as well as from clinical observation is that the diet for a nursing woman in childbed should not differ essentially from the mixed diet proper for a woman during pregnancy.

The proper mixed diet for a person not engaged in much muscular work is one that contains about 3 ounces of solid proteids, $2\frac{1}{2}$ ounces of pure fat, and 10 ounces of carbohydrates, that is, sugar and starches, with 3 to 4 quarts of water. About $1\frac{1}{2}$ to 2 quarts of water are contained in the food, including fruits, soup and milk, while 1 to 2 quarts are drunk as a beverage. A simple dietary for a day may be given as an example:

On wakening, about 7 A.M., a cup of hot milk.

Breakfast, 8.30 to 9 A.M. Fruit: Apples, oranges, pears, grapes, etc. Coffee with cream, oatmeal and cream, eggs, toast, and butter.

1 P.M. Fruit, chopped beef or steak, potatoes, peas, toast, butter, tea with cream.

Dinner, 6.30 P.M. Soup, chicken, rice, toast, butter, pudding, etc., coffee.

Any diet is to be arranged to suit the needs, the condition, and the appetite of the patient. For the first day it usually happens that she has no appetite for much solid food, but craves quantities of liquid. This is because of the great loss of water during labor from perspiration and perhaps from hemorrhage. This desire should be gratified and solid food not forced on the patient. If, however, she is hungry and wishes a hearty meal immediately after labor, there is no reason why this wish should not be gratified. To force a liquid diet upon a patient who has no need for great quantities of liquid is as unwise as to force solids upon a patient who needs liquids. The same remarks apply to some extent to different articles of diet and especially to the use of alcoholic drinks. A patient who is accustomed to the use of beer or wine with her meals may suffer from their withdrawal,

while to force such drinks upon one who has never used alcoholic drinks with the idea that they are specially needed is equally unwise. One must use common-sense, seeking only to give enough food to supply the needs of the individual, trying to combine the food elements approximately correctly and avoiding substances known to be difficult of digestion.

The questions frequently arise (1) whether the quantity of milk may increase or diminish by diet, and (2) whether the quality can be so changed. The amount of milk is diminished by greatly lessening the quantity of food, while free feeding frequently increases the milk secretion. A decrease in the quantity of milk is very rarely desired except perhaps during the short period of breast congestion that occurs during the third to the fifth day. While there may be no objection to a restriction of the diet at this time, still such restriction is hardly necessary, for the disturbance may be managed without difficulty by the rules given on page 243.

The best way for a nursing mother to increase the supply of milk is to eat plenty of nourishing food. The common idea that taking much liquid will increase the milk is largely erroneous. Too little water may interfere with the secretion, but milk is formed from the solid elements of the food, and they are absolutely essential. Beer, malt extracts, etc., which are much renowned as galactagogues or milk producers, probably owe their reputation to their property of stimulating the appetite and thus inducing a better nutrition. Of the solid elements of food it is probable that the protein or nitrogenous element is most important in producing milk. It has been proved that all the elements of milk, including the fat, may be produced by the breaking up of the protein particles. The fat of milk, for example, does not come from the fat of food, but from the proteins of food. For this reason pure albumens have been used as milk-producing agents and much advertised on this account.

There is a limit to the quantity of food that can be taken with advantage. If a woman who is underfed secretes too little milk, increasing her food consumption will probably increase her milk. A well-fed woman will not be so affected. If she has a deficient secretion it is probably due to some

deficiency in the structure or function of the breast not dependent on her eating. It is unwise to feed such a patient more than she needs in the attempt to increase the supply of milk. Even when some increase in food increases the milk it does not follow that the increase can be continued indefinitely. Over-feeding a patient is always worse than useless.

The quality of the food and the method of serving it have an important effect on the breast secretion. Not only is the appetite stimulated by savory, well-prepared food and a greater quantity is taken without forcing, but also the nervous control of the secretion seems to be affected just as the nervous mechanism of the salivary and gastric secretions is affected. Hence the nurse should get the coöperation of the cook in preparing the food, and then see to it that the meal is served properly.

The question whether the properties of milk can be changed by varying the composition of the mother's food cannot at present be answered definitely, for sufficient scientific observations have not been made to give any basis of fact. If it were possible to increase the fat of the mother's milk, for example, or to decrease the albumen of the milk when this element is in excess by changing the diet, such a food would be of very great value. It can only be said that an average mixed diet is best adapted to give milk of proper composition.

The frequency of feeding or the number of meals per day is a question that often arises. If the stomach be in a normal condition the ordinary rule of three meals a day, with perhaps a drink of hot milk early in the morning, is the best rule to adopt. If the patient wants a light lunch late at night or between meals it may be allowed. The case is different if the stomach is unhealthy—a condition not uncommon. One of the abnormalities most frequently met with is the dilated, prolapsed stomach. Such an organ does not empty itself properly and the partly digested remaining food ferments and causes a very disagreeable sensation. Putting additional food into such a stomach would evidently add to the trouble. The common-sense rule in such a case would be to give food only after the stomach is emptied.

In such cases it is often of much value to assist the emptying

of the stomach by a simple kind of massage. About two to three hours after meals, when the movements of the weakened stomach have been feeble, the nurse, standing beside the patient, facing the foot of the bed, grasps the abdomen with both hands so as to get below the stomach and raise it, making kneading movements to empty its contents into the small bowel. The patient may incline slightly toward the right side. This maneuver may be assisted by having the patient drink a small quantity of some carbonated water. This procedure is kept up for five minutes and may be repeated in half an hour if necessary. It would be unwise, however, to empty at one time too large an amount of the acid contents of the stomach.

In all these cases it is important that the patient does not drink large quantities of liquid with her meals or shortly after them. The rule should be to drink what is needed fifteen to thirty minutes before meals. Careful management of the stomach is very necessary for the satisfactory progress of the patient and particularly for the proper milk supply of a nursing mother, and hence requires the most intelligent attention of the nurse.

Breasts.—Nearly every woman in childbed requires that some attention be paid to the breasts. More than half of all nursing women have abrasions of the nipple of greater or less extent. These, if neglected or improperly managed, may lead to infection of the breast with abscess formation, much suffering, and great injury. Moreover, when the breasts become diseased the children lose their proper nourishment and as a result much sickness and many deaths occur. Hence no subject is of greater importance to nurses than that of the proper management of the breasts.

How often and how long at a time an infant shall nurse concerns both mother and child. Considering now only the mother, we observe that if the infant nurses too often or too long the mother loses her rest, wastes her strength, and becomes exhausted. Moreover, if the child holds the nipple very long in the mouth it becomes softened and more easily wounded and infected. When speaking of the care of the child we shall give rules on this point; here we shall only

remark that ten to twenty minutes are about the proper length of the nursing, and once in two to four hours is often enough.

Colostrum.—For from one to three days after labor the secretion of the breast has not the composition of ordinary milk. This first secretion is called colostrum. The quantity of colostrum that the child can get by nursing varies from 1 or 2 drams to an ounce. It is very important that the infant obtain this colostrum both because it has considerable value as food and because it has a certain laxative effect that is good for the child. Moreover, the act of nursing is important for the mother because it stimulates the contraction and retraction of the uterus and thus tends to prevent hemorrhage and assists in the proper involution of the uterus. Also the stimulation of the breasts by the act of nursing favors the beginning of the secretion of milk, so that the milk “comes in” earlier and with less disturbance than when the child is kept from the breast. Therefore the child should be put to the breast as soon as it is cared for and dressed, unless the mother be very weak from hemorrhage or the exhaustion of labor. For the first two or three days the child may nurse every three to six hours, according to its condition and that of the mother. The remark frequently heard, that the mother has no milk, need not be regarded too seriously, for it is not milk that we expect the child to obtain. The child will generally get some breast secretion, that is, colostrum, even when the breast seems empty to the superficial observation of the patient and her relatives.

Distention of the Breast.—Gradually this first secretion changes to the ordinary milk and generally the third day the breasts begin to fill. This condition of fulness or distention of the breast, also called congestion or engorgement, is frequently attended with considerable pain. It is important that the nature of this condition be well understood. Many nurses believe that this distention of the breast is caused by the milk which fills the milk tubes or ducts, and there is a general fear that this milk may stagnate and, if not emptied, cause caked or inflamed breasts. This conception of the cause of distention is largely false and the fear entirely groundless.

The distention is caused largely by the swelling of the gland cells that are secreting the milk and by the fulness of the blood and lymph vessels and the lymph spaces that surround the glands. If these vessels be emptied by massage, as will be described later, the distention of the breast disappears although not a drop of milk has been evacuated. Moreover, decomposition of milk in the healthy breast never occurs.

Sometimes a woman cannot or should not nurse, as when the child is dead or when she has tuberculosis or some serious disease that would make the drain of nursing a menace to the life of the mother. Here the breasts should be supported by a bandage and relieved by massage or ice-bags, and in a short time the congestion of the vessels will disappear while the milk in the ducts will be absorbed, leaving no bad effect.

These facts show that congestion of the breast, however painful, is not dangerous and should give rise to no anxiety. It should be carefully distinguished from the results of infection of the breast. The filling of the breast is never attended with fever, that is, with a rise in the temperature of the body to 100° F. The breast may be very tender, hot, hard and swollen, but the thermometer in the mouth or rectum shows no fever.

The management of distention of the breast has for its object the relief of the local pain. Four measures will be considered: (1) Evacuation of the breast with the hand or pump, (2) support by bandage, (3) application of ice-bag, and (4) massage.

Pumping.—Evacuation of milk either by milking with the hand or by the use of the breast pump will often give temporary relief. It is objectionable because both the hand and pump cause irritation of the breast, because the stimulation of the breast by these measures is not desirable, and because it is not necessary. Whatever relief is given by the nursing of the child is of course desirable. It may be necessary to obtain milk to feed a very weak child that cannot nurse; otherwise, if the following directions for supporting and massaging the breast are carried out, no pump will be needed.

Bandage of Breast.—The support of the breast is an important means of relief. Pain or disturbance of the full breast is caused chiefly by the dragging down of the healthy gland as the woman lies on her back. She may not be able to lie on her side because of the pressure on the lower breast or for other reasons. The glands may be supported from below by pillows pressed against the sides, but better by bandages which hold them in place. The object of the bandage is support and not compression. It must be applied so as to



FIG. 91.—Breast bandages.

give relief and not cause more pain. This will be accomplished if it is applied so as to hold the breast to the front of the chest.

The simplest bandage is most easily applied and quite satisfactory. It is a piece of strong cotton cloth long enough to go around the body and lap sufficiently to pin in front. It should be about 16 inches wide with notches 7 to 8 inches deep for the shoulders over which the edges of the notches are pinned. It is applied as follows: The patient should

lie on her back near the edge of the bed, the bandage under her, its notches fitting well in the axillæ. The nurse now takes hold of one end of the bandage with one hand and with the other hand draws up the breast quite well to the front of the chest, where it is held by the bandage. Then the patient with a hand under the breast, fingers and thumb being extended, holds it in place. The other breast is drawn



FIG. 92.—Application of breast bandage.

up and supported in the same way. Then the bandage is fastened with five medium-sized safety pins, the lower edge of the bandage being drawn perhaps a little tighter than the upper edge. The flaps are then fitted well over the shoulders. This bandage of course must be opened every time the child nurses and afterward reapplied.

Sometimes the double Y-bandage is preferred. It is made out of the strongest cotton cloth and consists of a back piece

4 to 5 inches wide and 14 to 20 inches long, to each end of which are strongly sewed two diverging strips, each 4 to 5



FIG. 93.—Breast and abdominal bandages applied.

inches wide and about 12 inches long. The lower limbs of the Y's, which go under the breast, are fastened together in front with safety pins, then the upper limbs in the same



FIG. 94.—Double Y-bandage.

manner. With this bandage the nipples are left free so that pressure upon them is prevented and the nursing of the child

allowed without unfastening the bandage. The upper and lower limbs of the Y's in front may be fastened together with a safety pin better to support the inside of the breast.

Ice-bags.—If the breasts are very sensitive and not sufficiently relieved by the bandage, ice-bags should be applied. The large, strong, vulcanized canvas bags are more desirable than the rubber bags and can be fitted better to the breast. The axilla and arm should be protected by cloths. If the tender part of the breast is on the lower or outer side, the



FIG. 95.—Ice-bags applied to breasts. On the right breast is a large, strong, vulcanized, canvas cap-bag supported by a pillow, and on the other a pig's bladder fastened to the breast bandage with safety pins.

bag is applied and held in place by shoulder pillows. If the upper, middle, or inner part of the breast is chiefly affected, the bag is then applied and held to the bandage with strings or safety pins. The patient must be in bed, of course, and the breast kept supported with the bandage.

Massage of the Breast.—Massage of the breast is a measure which has been so often misused that it is a question whether it has not caused more harm than good; yet, if it be properly done in suitable cases it may be of great value. It

should be used only in cases of painful distention due to congestion, and never in cases of infection. The proper method of making massage will now be considered.

The common method of performing massage is incorrect and founded upon a false principle. The direction is generally given to rub the breast from the outside toward the nipple, as if the intention were to evacuate the milk or perhaps open up some occluded milk duct. This is not the object of massage at all. The blood and lymph channels and spaces of the tender, congested breast, like those of a sprained joint, are overfilled with blood and lymph. Just as in a sprained joint the surgeon begins on the inner side of the swelling and empties out the excessive fluid by rubbing toward the heart, gradually approaching nearer and nearer to the joint until the swelling and tenderness are gone, so here, beginning outside of the breast, we empty first the vessels which lead from it, and then approaching the gland itself rub always so as to favor the carrying away into the circulation of the extra fluids. To understand the details of the operation, however, it will be necessary to study for a moment the anatomical arrangement of the blood and lymph vessels of the breast. Both glands are composed of fifteen to twenty separate secretory systems (see page 50), each of which consists of a main duct which divides and subdivides until we come to a last group of distended acini lined with a special kind of cells that secrete the milk. The ends of the tubes form the gland proper. Around the gland lobules the lymph routes form a network and empty into channels that run along and surround the milk ducts. These are joined somewhere near the outside of the areola by ducts coming from the nipple. From this juncture channels pass down under the breast along its floor outside and upward, joining with other lymph ducts until they finally pass into the axilla and empty into the chain of axillary glands. The blood capillaries that surround the gland lobules pass into venules that follow a course similar to the lymph ducts, passing away from the breast in deep vessels to empty into the large vessels of the axilla and the lower front part of the neck.

From this description of the structure of the breast, it is evident that to massage it properly it is necessary to begin outside and above the gland and then work under the gland as much as possible before touching the breast itself. The operator or nurse should sit on the side of the patient opposite to the breast to be treated—for example, upon her right side if the left breast is to be treated. In this case the patient would lie upon her right side with her left arm somewhat raised, supported upon a pillow behind her. The



FIG. 96.—Massage of the breast.

nurse begins by rubbing at first superficially and then more deeply with the palmar surface of the thumbs or hands. In the deep rubbing she must remember that the skin is not to be rubbed, but carried along with the thumbs over the deep tissues. After the region surrounding the gland has been sufficiently treated, she rubs in the same direction as far as possible under the gland; then the gland itself may be massaged. Recalling the course of the lymph and venous routes and small vessels from the outside of the gland toward the circle outside of the areola, she rubs with very gentle

movements in the same direction, using the ends of the fingers. In connection with these movements kneading manipulations tending to empty the channels under the breast are combined.

With soft hands and well-regulated pressure, all this may be done without the use of any lubricant. It is better, however, to use a solution of soft soap. Unless the patient is relieved without much pain the massage is not properly given and should be discontinued. When rightly and successfully given, in the course of fifteen to twenty minutes the previously swollen and very sensitive breast is flaccid and relieved.

Infection of the Breast.—Having now considered the matter of the congestion of the breast, let us turn to the very important subject of the infection of the breast. Mastitis, or inflammation of the breast, is the term generally employed to denote the condition which results from infection. It should not be forgotten that stagnation of milk does not cause an inflamed breast. Only the presence of bacteria growing into the gland tissue can cause fever and the other symptoms of infection.

The bacteria generally found in breast infection are the staphylococci or those which grow in the cluster arrangement. Sometimes the chain bacteria or streptococci are found.

It is now agreed that breast infection generally starts from the nipple. The question arises, How do the bacteria get to the nipple?

All regions of the skin are covered with bacteria. The number is especially great around the nipple of the pregnant woman because of the good soil furnished by the secretion which exudes to a greater or less extent. Sometimes a kind of crust forms over the nipple that contains numberless germs. Hence, if the nipples are not properly cleaned before nursing, the germs are there already, prepared to grow upon any abraded or injured surface.

In this connection we may speak of an infection from a source not very common, but yet quite important, namely, suppurating Montgomery glands. These small glands

around the nipple sometimes become infected during the nursing period, and thus a source of danger to the nipple.

If the germs present on the breast be removed by careful washing before the first nursing, the nipple may afterward become contaminated from several sources. Articles of clothing, especially the shirt, may be the source of contamination. Freshly washed clothing is practically sterile, but after it has been worn a few hours it contains many germs, and in twenty-four hours it is well saturated with bacteria. The fingers of the patient or nurse may be the carriers of infection, especially if the common practice of pulling out the nipple, so that the baby may better grasp it, is resorted to. When the nurse fails to disinfect the hands after handling the napkins of the baby or mother, this source of danger may be important. Then the child may be the cause of trouble. Sometimes the mouth may contain dangerous germs, but generally the mouth becomes contaminated from the breast. The baby's face rubbing over the breast is more frequently the origin of the trouble. If the baby has sore eyes or pustules or boils on the face or head, we can readily see how the skin may become contaminated.

The presence of germs alone cannot cause infection of the breast. There must be a break in the epithelial covering of the nipple. This fact shows the importance of the form, size, and structure of the nipple and the detrimental influence of deformed nipples. A nipple perfect in shape and size, so that it may be easily grasped and through which the milk flows freely, is much less likely to suffer abrasions from the suckling than one that is lacking in any of these characteristics. If the nipple is small or depressed the child must grasp it more firmly and thus injures it. A so-called cracked nipple results from the formation of a fissure or the injury of a natural fissure by the act of nursing. The fissure may be parallel to the nipple or at right angles to it. Such fissures are, of course, especially dangerous points of entrance for the infection.

When the secretion is slow and scanty the suction required and the length of the nursing will be greater, as well as

the risk of injury and infection. This strong suction, for example, produces blisters, varying in size from the head of a pin to that large enough to cover the end of the nipple. The supply of milk and the ease of its flow thus become important factors, determining infection.

A further factor influencing infection and determining its extent is the resistance of the maternal organism. This is a factor in all infections, and depends upon the general health and the immunity to the attacks of the germs likely to be found in the contaminating material.

The mode of growth of the infecting microbes does not differ essentially from that in genital or other wounds. The germs may remain confined to the abrasion or fissure of the nipple, causing some redness and perhaps some discharge; or they may penetrate deeply into the gland or they may pass under the gland, or, lastly, they may grow over the breast and under the skin. The last mode of growth is characteristic of the chain bacteria or streptococci. When the germs penetrate the breast it is a peculiar fact that they generally follow one or more ducts with their ramifications and make a circumscribed hardness that may terminate in abscess. When the infection is confined to the nipple there is not much general disturbance as a rule. A chill with fever, headache, etc., generally denotes extension of the infection into the breast. It does not, however, mean that an abscess is unavoidable. In 8 or 9 cases out of 10 the formation of pus may be prevented if proper treatment be instituted.

Although this differential diagnosis between infection of the breast and simple congestion concerns the physician much more than the nurse, it is, however, well for her to know that the presence of fever due to the breast shows infection. Whether an abscess is formed or not is, of course, a question for the doctor to settle.

From what has been said concerning the cause of infection, it is evident that it may be prevented if we can prevent the access of the infecting microbes or if we can avoid the abrasions or breaks in the epithelial covering of the nipples. The latter is often impossible, because of some

deformity in the nipple or because of the character of the skin. If there is a wound of some extent, like a deep fissure, a protecting shield may be used, but the danger from small, often unobserved abrasions remains. In preventing the access of germs, as long as the nurse is in attendance she has great responsibility.

Before labor something can be done to get the breasts in a proper condition. The main thing is to keep the nipples clean and toughen them so that they will not become sore. The use of salves or of tannin solutions, as frequently advocated, is generally unnecessary and possibly harmful. Exciting the nipple in any way before labor may cause uterine contractions and has produced miscarriage or premature labor. The efforts to draw out a depressed or retracted nipple do not do much good. The best advice to a woman during pregnancy is to keep the breast as clean as other parts of the body by the use of soap and water, and in the last two or three weeks rub the nipple rather thoroughly with the towel after washing.

After labor the responsibility of the nurse begins. Before the child is put to the breast she washes the breast and particularly the nipples carefully with soap and water, and then with 60 to 80 per cent alcohol. The proper way to wash the nipple with alcohol is not to take a piece of wet cotton or gauze and rub vigorously. This causes pain and may abrade the surface, the very accident that we want to avoid. With cotton held below the nipple, alcohol may be poured over it from a bottle, or the cotton may be saturated and then the alcohol squeezed out, so as to thoroughly drench the nipple. Of course no drying is necessary, as alcohol evaporates readily. If the child should be put to the breast before the alcohol has time to evaporate, the nipples may be washed off with sterile or boiled water.

To protect the nipple from subsequent infection it may be washed in the same way with alcohol immediately after nursing, when the abrasions are open and before the germs carried by the child have had a chance to grow. We choose alcohol as a disinfectant because it is fairly efficient and entirely safe. Boric acid solution, so much used, is such

a weak disinfectant that it is but little better than sterile water. Efficient disinfectants like carbolic acid or sublimate solution cannot be used because they are poisonous to the infant. Very rarely the nurse may be directed to use a sublimate solution in case of an infected or wounded nipple. In such case she must wash off every particle of the poison very conscientiously before the baby is allowed to touch the nipple.

After the nipples are cleaned, they are protected from contact with the more or less soiled clothing by covering them with sterile gauze. A few layers may be fastened to the inside of the gown or placed inside of the supporting bandage and changed as often as necessary. Nipple protectors made of metal or glass or wood are sometimes used for the same purpose. There is the objection to these protecting shields that they collect the milk that frequently flows during the nursing interval and cause the nipples bathed in milk to become soft.

The danger from dirty hands needs only be mentioned. If the nipple must be erected for the child to grasp, the nurse may press around its base or else take hold of it with gauze, or she may put on gloves.

The chief danger, as before mentioned, is from the face of the child contaminated with pus from sore eyes or from boils. To protect the breast from this danger is difficult. If the pus comes from sore eyes, they should be washed before nursing and then the face thoroughly washed. If the baby has boils they should be carefully opened, as will be directed in the next chapter.

In case the glands of Montgomery are infected, each separate diseased gland should be opened with a sterile needle after flooding the region with alcohol or swabbing it with tincture of iodine. A shield may be necessary.

Nipple shields are very important in cases of depressed, deformed, or injured nipples, as well as when the nipples are very painful. In the majority of cases there is a day or two at least when nursing is very painful on account of the nipple. A proper shield will give much relief and hence should be a part of the patient's outfit. The best shield

has the bowl of glass and a rubber nipple attached to the bowl. A bone guard keeps the child from getting the whole nipple into its mouth. A shield sometimes causes pain because of faulty construction. The opening may be so small as to constrict the nipple. In a shield very commonly used, the bowl has a small opening leading to the nipple into which the breast nipple is drawn and pinched. Sometimes the flange of the bowl is too narrow or attached to the bowl at an improper angle. The nurse should study the construction of the shield, and if it causes pain she should be able to detect the fault and find one that will fit the case, or, if necessary, have one made. We should make the shield to fit the patient and not expect the patient to fit the shield.

The rubber nipple is an important part of the shield. It must fit the nipple tightly and the opening in its end must be large enough, but not too large. The hole can be easily enlarged to the required size by passing through it a hot needle.

The care of the shield is a matter of importance. The common practice is to let the shield lie around on the bed or a table for a few minutes after nursing, and then put it into a bowl of boric acid solution that is perhaps quite thick with flakes of milk. This illustrates again the misplaced confidence in the disinfectant properties of boric acid. Immediately after nursing the nipple should be taken off from the bowl and both thoroughly washed and boiled. It is well, after washing the outside of the nipple, to invert it, when the inside can be also well cleaned. After both bowl and nipple are cleaned, they are wrapped in a clean napkin or towel ready for use.

Occasionally the nurse has difficulty in getting the child to draw through the shield, but patience and perseverance, sometimes filling the bowl with milk to get the child started, will succeed unless the child is feeble. It may be necessary to obtain the milk by manipulation or pumping and feed with the dropper or spoon.

Treatment of Breast Infection.—The treatment of a slight localized infection of an eroded or fissured nipple where there are no general symptoms consists in thoroughly clean-

ing the wound with alcohol and using the nipple shield when the child nurses. If the fissure is quite deep it might be well to stop nursing for a day. Sometimes stick nitrate of silver is applied to the inflamed fissure. Balsam of Peru and collodion are also used to close the wound.

In deeper infection of the breast, as known by the presence of a chill and fever and other symptoms of infection, responsibility for the management of the case rests with the physician. In order to prevent the formation of an abscess it is a good rule to stop nursing the child on the affected side for a few days, support the breast with a bandage, and apply an ice-bag over the infected area. Properly applied, the ice will give great relief. Formerly hot poultices and other hot applications were much used. A good fomentation is a cloth moistened with a weak antiseptic solution covered with some impermeable substance like oil silk or rubber cloth, over which is placed a hot-water bag. The redness and tenderness about the swollen, infected area will generally disappear after a few days unless suppuration takes place. This is known by fluctuation or perhaps by aspirating with a hypodermic syringe, using a large needle.

If only one breast is affected the child may nurse from the other. If the mother has been around she must go back to bed in order that the breast may be kept at rest and ice applied. When fever and tenderness have subsided, nursing may be resumed with care, not giving up the ice for two or three days.

When an abscess is formed, it should be opened at once, but it is well to continue the ice-bag and the bandage. Some kind of local anesthesia is generally used. The incision is small and radiating from the nipple, and a very small wick drain is used that can be removed in twenty-four to forty-eight hours.

A large suction cup may be used during the dressing to assist the drainage. It also causes a congestion that may assist in the healing. It is applied intermittently five minutes at a time for two or three times.

The artificial congestion, or hyperemia, is also used before incising to heal a deep infection. This is called the Bier

treatment. It is more painful than the ice-bag and rest treatment and not much used in this country.

When a large abscess has formed, the evacuation of the pus and establishment of drainage is a serious matter. Sometimes general anesthesia must be employed. An irrigator and a large quantity of solution may be required. Drainage tubes or cigarettes and gauze bandages must be on hand. In these cases subsequent dressings are often needed for many days.



FIG .97.—Bier suction applied to an inflamed breast.

Galactorrhea.—A deficiency in the secretion of milk (agalactia) and the possibility of correcting it by diet have been discussed on page 239. The term polygalactia, which means excessive secretion of milk, is applied to that condition when there is a continual distention of the breast, and apparently more milk is produced than is needed for the child. It is generally associated with galactorrhea or an excessive flow of milk. The milk discharges from the nipple in the intervals between nursing. In some cases a pint or more may discharge in the course of a day. This is not only uncomfortable to the mother, but also a drain on her. Unfortunately but little can be done to control the flow. Pads to absorb the milk and compression bandages are used.

Hypertrophy of the Axillary Sweat Glands.—Occasionally a swelling is noticed in the region of the axilla on one or both sides. It may be small or it may reach the size of the hand. Sometimes several distinct swellings are present. If these are carefully examined they will be found to lie in the skin and not under the skin. They are enlarged sweat glands and not lymphatic glands. At times a secretion can be obtained from them which has been called a kind of milk, and this has led to the idea that these swellings have the structure of milk glands. It is true that supernumerary breasts exist and are found on various parts of the chest and sometimes in the axillary region, but these swellings that we are now considering have not the structure of the mammary gland. They may appear in the last weeks of pregnancy or more often in the first week of the puerperium. They sometimes cause a little discomfort which can be relieved by the application of an ice-bag or a compress. They disappear spontaneously in a few days.

Care of the Room.—The temperature of the room depends somewhat upon the question whether the infant is constantly present in the lying-in chamber or not. Every lying-in room should contain a thermometer. As will be shown in the next chapter, for the first two or three weeks it is better for the infant if the temperature of the air is not below 75° F. If the baby is feeble or troubled much with colic, a temperature of 80° F. is still better; hence if the baby is kept in the room with the mother a temperature of 75° F. should be maintained. If the baby has a separate room and is only brought to the mother to nurse (the best arrangement where it can be carried out), the temperature of the lying-in room may be kept a few degrees lower if the mother wishes. These remarks apply of course to the colder seasons of the year. In the summer, when the problem is to keep cool, the proper shading of the room, good ventilation, and keeping a moist air are the things to be attended to.

Under any circumstances, proper ventilation is very important. This means a free supply of good air without the creation of a dangerous draft. Generally we have to use the windows for ventilation. At least every two to three hours

there should be a complete and rapid change in the air of the room. The patient should be well covered and two or more windows opened as far as possible for about five minutes. In this way there is a complete renewal of the air without cooling off the walls of the room. At other times windows may be slightly lowered from the top or raised from the bottom so that the air may be kept in good condition.

The comfort of the patient depends very much upon the degree of moisture present. A hygrometer in the room is very desirable. If the air is too dry it may be easily moistened by throwing a spray of water from a hand atomizer, now very commonly found in most households.

Odors caused by the bowel movements are never to be concealed by burning pastilles; they must be removed by ventilation.

Since the nurse is responsible for the care of the room, she may be obliged to attend to the cleaning of it herself. This implies that she understands how to sweep both carpets and hardwood floors, and that she knows that filling the air of a room with dust which settles back on the furniture to be again dusted into the air is not cleaning. A good housewife will be very uncomfortable in bed if her room becomes untidy and neglected. The more refined she is, the more will she hesitate to speak to the nurse about a dirty corner or a disorderly dresser or neglected, wilted flowers. The condition of a room is, moreover, one of the best indices of the breeding and training of a nurse. A nurse who neglects her room is hardly one to inspire general confidence in other things; hence, both the interests of the nurse and the welfare of the patient make it desirable that more attention should be given to this subject than it ordinarily receives.

Rest.—To secure the best progress of a patient and make of childbed what it should be, a fortnight or a month of quiet rest and happiness after the long months of pregnancy and the severe labor of delivery, careful attention must be given to other details of management. The patient should have mental as well as physical rest. She remains in bed and careful attention is given to her bodily needs. She

should also be protected from mental annoyances and harmful excitement.

Of chief importance is the conduct of the nurse. An unsympathetic nurse can so disturb the patient that she will always look back to her childbed with unhappiness. Conscientious performance of duty, unselfish patience, and tact are the three requisites in a nurse, and the lack of any one is a serious drawback to her usefulness. Many a nurse gives too little thought to the last two qualifications, thinking more of her own comfort than of the patient's feeling. She talks much of the nightly disturbance of a colicky baby. Lacking in tact, she fails to observe the patient's disinclination to hear stories of other patients or of the hospital, or the gossip in which she may be a proficient entertainer. Some otherwise good nurses are impossible because of this lack of tact or because of an uncontrolled temper. Few, however, are incorrigible, and very many need only a reminder of their failings. To these the following suggestions are recommended:

Be patient. The more the baby cries and the mother worries, the more need of patience. Never allow yourself to speak or think of the baby as cross or bad-tempered. A baby cries because something is the matter. If you cannot find out and correct the cause, bear with it. Never call the mother cranky. This word, unfortunately heard not infrequently in the hospital, is often used by the nurse as an excuse for a retaliatory spirit or one which will very quickly engender coolness and a mutually unsympathetic attitude.

Avoid gossip about other patients, their families or family affairs, or about physicians. However interesting such gossip may be, it will not increase the patient's respect for you, while it may cause you trouble in ways you little imagine.

Avoid showing anxiety at any emergencies that may arise. Keep a sharp watch of the case and report immediately to the physician anything abnormal, but carry what responsibility you have to take quietly, and do not needlessly or uselessly shift it on to the patient.

Protect the patient from household annoyances. Members of the family sometimes need to be reminded of this rule. If troubles arise in the housekeeping arrangements, help to smooth over the difficulties and keep the patient free from worry.

You must see that the patient has a time for sleep during the day, and you should protect her from disturbance from every source during this hour.

In normal cases for the first three or four days of child-bed a few short visits from relatives or intimate friends may be allowed. Exaggerated strictness in this regard is unnecessary. The nurse must only observe that the patient is not tired or exhausted by these visits and that her rest is in no way disturbed.

Many patients wish to be much alone even in their waking hours. The nurse should instinctively recognize this fact and gratify her patient's unexpressed desires.

Toilet.—The comfort and welfare of the patient depend very much upon the general care given to her toilet. It is not necessary to speak of the care of the mouth and hair. The care of the genitals and the breast has been described before. The rest of the body should receive a sponge bath twice a day with water or alcohol.

Posture.—If the patient wears a proper abdominal bandage and a well-fastened napkin, she may with advantage move around the bed as freely as she likes and lie in any position agreeable to her. The possibility of an air embolus has caused some physicians to keep their patients quiet after labor. If there is any danger from this source it is over in a few hours. After the first week it is well for the patient to take the knee-chest position for five minutes at a time four or five times a day. It helps to relieve pelvic congestion and assists involution and tends to prevent backward displacement of the uterus. It may be made a part of the exercises about to be described.

If any person, even a healthy man, be put to bed and kept at rest in a recumbent position for several days he becomes weak from lack of exercise and from disturbed circulation, so that if he suddenly attempts to sit up he

becomes dizzy and faint. This is the condition we frequently find in women in childbed. There are reasons why women should remain in bed as a rule from seven to ten days, but the muscular weakness and faintness that frequently arise from such a course are evils that should be avoided if possible. The chief reason why a woman should remain in bed during her puerperium is that she may rest and recuperate from the exhaustion of her pregnancy and her labor. The care of the child and the immediate resumption of her household and social duties would be too great a strain on the civilized woman. Even among savage or half-civilized races, with the exception of a few tribes of North American Indians, there is a general observance of a certain period of exclusion from association with others, ostensibly perhaps on account of uncleanness, which practically results in a period of rest. In spite of the most exact rules regarding a gradual progress, permission to get out of bed generally results in the resumption of household duties. Moreover, a perfect healing of the frequent tears in the uterus, vagina, and perineum is favored by the recumbent posture. The lochia generally ceases earlier and the involution of the genitals progresses more undisturbed; there is less tendency to a prolapse of the vagina and uterus. Before involution of the abdominal walls there is more danger of enteroptosis, the prolapse of the abdominal viscera; hence a physician feels it a risk to allow a patient to get up before involution has progressed fairly well, even at the end of the second week.

Massage and Passive Movements.—To avoid the evils that results from the non-use of the muscles, from the accumulation of waste in the tissues, etc., massage and passive movements and bed exercises are of great value. A professional masseuse can be employed with advantage after the fourth day, for the nurse who cares well for mother and child has scarcely time to give massage. Yet very few patients can afford to have a masseuse, and the question arises, Is massage of sufficient importance to justify the nurse in slighting some other work if necessary in order to give it? Generally, bed exercises which the patient may

take without assistance are a good substitute for massage. Sometimes when massage is very desirable it cannot be given by the nurse because she has never been taught the manipulations.

To those who have not been trained in this important art, one may say, as was stated before in speaking of massage of the abdomen for the management of constipation (see page 235), that the principles are simple, and applied common-sense will soon help one to acquire considerable proficiency.

Suppose a nurse allows thirty minutes for the massage and ten minutes more for movements of the lower extremities. With the patient on her face she first rubs the back and hips superficially for about two or three minutes and then kneads and rubs deeply and taps for about six minutes, leaving one minute for a rapid rubbing of the skin with alcohol. Then ten minutes are given in the same manner to the thighs and legs, the patient still remaining on the face. Afterward she turns and lies on her back and the remaining ten minutes are given to the abdomen and front surface of the lower extremities. Then come the passive movements, which consist in the flexion of the legs on the thighs and the thighs on the body against a slight resistance of the nurse, followed by opposed extension of thighs and legs. These movements, first of one and then the other extremity, or of both together, varied with similar movements of the feet, combined with the massage, are at least sufficient to prevent stagnation of the circulation and weakness of the muscles that have made confinement in bed so objectionable.

Bed Exercises.—For the voluntary exercises, which may also begin on the fourth day unless the breasts are too uncomfortable, the patient should be flat on the bed, with the breast bandage and the heavy clothing removed and with the windows open. In place of the resistance of the nurse the patient makes her own resistance. While she is contracting the flexors she holds the extensors tense, and *vice versa*.

The first movement is a breathing exercise. The initial

position is with both arms, hands, and fingers extended to the utmost, and forming with the body a cross and with the lungs full. The extended arms are then swung through arcs of 90 degrees and brought together above the body, breathing out through this part of the movement; then they are slowly swung back to the original position during inspiration. The entire movement requires fifteen to twenty seconds. This movement is repeated four to eight times.

The second movement is combined flexion and extension of the parts of the upper extremities. Beginning from the initial position the patient flexes in order slowly, and against her own strong resistance, the fingers, wrists, forearms, and



FIG. 98.—Bed exercises: First position, full inspiration.

finally arms against the chest, breathing out all of the time. Then she extends the parts in the reverse order and inspires during the half-movement. The entire movement takes about twenty seconds. This she repeats four to eight times according to its effect. Ordinarily she would begin with four movements and after two or three days increase the number.

The third movement is extension and flexion of the feet. The patient begins with the legs straight, feet extended, and toes flexed. Then she flexes the feet and extends the toes, and *vice versa*. About twenty of these movements are made in a minute without regard to the breathing.

These three movements take about four or five minutes. The patient then rests a minute or two and repeats them.



FIG. 99.—Bed exercises: Second position, expiration.

The three movements repeated constitute one exercise. Three to five exercises are taken each day from the third



FIG. 100.—Bed exercises: Autoresisted flexion and extension of upper extremities.

or fourth day to the eighth. Then the fourth movement is added.

The fourth movement is the combined flexion and extension of the legs, thighs, and feet. The thighs are flexed on the abdomen, the legs on the thighs, and the feet on the legs and the toes extended. Then the movement is reversed. Five to ten movements are made at the rate of about five movements per minute.

From the tenth to the fourteenth day two more movements are added. The fifth movement is a flexion of the extended lower extremities on the abdomen and a return to the initial position. The sixth movement is a flexion



FIG. 101.—Bed exercises: Flexion and extension of legs and thighs.

of the trunk on the thighs. The trunk is raised to a vertical posture by contraction of the abdominal muscles and without aid of the arms. The legs must remain on the bed. Both the fifth and sixth movements are made four to eight times at the rate of four times a minute.

Getting Up.—Formerly most physicians kept their patients in bed about four weeks after confinement. Recently a number of obstetricians have favored letting the patient get up on the third or fourth day, sometimes on the second day. For the reasons given on page 262 we favor a longer rest in bed, but recognize that there are many circumstances

to be considered which determine the practice in individual cases.

A patient who has had a healthy pregnancy and has been active up to the last, does not need as long a childbed, other things being equal, as one who comes to confinement weak and exhausted through chronic illness, like heart or lung disease, or through some trouble due to pregnancy or from overwork.

A patient who has had a short and comparatively easy labor, and particularly one who has had no hemorrhage, needs a shorter time in bed than one weakened by labor.

Lacerations of considerable extent are a contraindication to early rising.

Fever in childbed from any source makes a longer childbed desirable.

Persistence of the lochia, and especially the lochia rubra, makes necessary a longer retention of the horizontal position.

Rapid involution of the uterus is favorable to early rising. However, it is not always safe to rely upon the passing of the uterus from the abdomen into the pelvis as a sure sign of rapid involution.

A patient who has a nurse-girl to take care of or assist in the care of the child, may get up and dispense with the services of the nurse sooner than one who must alone take full charge of the baby.

Finally a doctor's decision concerning the length of time in bed must depend upon whether the patient can be trusted to follow the directions and not use the permission to get up for a few minutes to remain out of bed for half a day.

It is a common idea that a patient is likely to suffer harm if she walks much or walks up and down stairs when she gets out of bed, while it is all right for her to sit up for two or three hours. This is an error. In the usual sitting posture, enteroptosis, or falling of the abdominal organs, is favored by the still relaxed abdominal walls. On the contrary, if she holds in her abdomen when walking this danger is avoided. Moreover, the muscular contractions in walking favor the venous and lymph circulations. Hence it is better for the patient to walk two or three minutes at

a time several times a day than to sit up for twenty or thirty minutes. The rule should be: Walking comes before sitting.

In an average case the patient may get up on the seventh day and walk briskly one or two minutes, holding in the abdomen as just described. She may do this four or five times a day. This may be made a part of the regular exercise, being added to the bed exercise. By the tenth day she may walk five minutes and then sit for not more than five to ten minutes each time she gets up. During the third week she may be up half an hour each time, going to the table and also using the closet and perhaps the tub bath. During this time she may go up and down stairs and out of doors. She should not resume her household duties if she can help it. After the fourth week she is around as usual, but lies down to nurse the baby and remains lying about half an hour each time. It is also desirable for her to keep up the bed exercises until the end of the fourth week.

If the labor or puerperium has been abnormal so that she is not in good condition and her progress is delayed, especially if the abdominal walls are very lax and there is a considerable separation of the recti muscles, she should make extra efforts to strengthen the abdominal wall by proper exercise. It may be necessary for her to wear a supporting band when she begins to go around.

CHAPTER VI.

THE INFANT.

IN this chapter we shall consider the study and care of the new-born and young infant only so far as concerns the obstetrical nurse. By new-born we mean the child which retains any vestiges of its fetal condition. This stage generally lasts about two weeks until the navel cord is off and the wound healed. For a few weeks more the infant is often under the care of the obstetrical nurse. We shall notice briefly the more important physiological processes and describe the care of the new-born and young infant, taking up only the more common affections of the first few weeks of life and leaving to books on pediatric nursing the more extended study of children's diseases.

First Care.—The first care of the infant begins with the expulsion of the head. As soon as the head is born the physician, or the nurse in his absence, should find out whether the cord is around the child's neck by passing the hand over the back of the head. If a loop of the cord is felt around the neck it is pulled over the head, else it may interfere with the birth of the body, and on account of the stretching of the cord cause harmful traction on and premature separation of the placenta. Rarely the cord is wound twice around the neck. In this case first one loop and then the second is pulled over the head.

If the cord is not around the neck or as soon as it has been attended to, the face is at once wiped off with a piece of dry gauze or a clean towel or napkin. The outside of the eyes are wiped, but the lids are not opened, neither is the mouth wiped out or washed.

Should the birth of the body be delayed on account of large shoulders or absence of sufficient pains the head may

become quite black from congestion. Ordinarily this need not alarm the nurse should she happen to be alone with the patient, and under no circumstances should she attempt to hasten delivery by pulling on the head. If there be severe hemorrhage she may help to press out the child (see page 198), but generally there is no need to interfere.

Asphyxia Neonatorum.—As soon as the body is born, the first care of the attendant is to see that the child breathes. As a rule it grasps almost as soon as the body is out of the vaginal canal, soon cries, and within a minute or two is breathing regularly. Sometimes it makes a few respiratory movements while the body is still unborn. If the baby attempts to breathe while the head is still inside the vagina it is because of some obstruction to the fetal circulation and asphyxia is apt to result.

Should the child be alive and yet not breathe for two or three minutes after birth, it is said to be asphyxiated. Apnea, which means lack of breathing, is a better term than asphyxia, which means lack of pulse, but the latter term is in general use. The asphyxia or apparent death of the new-born is due to different causes and is of different degrees of severity. In any person the act of breathing is produced by a stimulation of the respiratory center in the brain by the lack of oxygen or by the presence of CO_2 in the blood which circulates in the brain. If this breathing center is numbed by poisonous substances in the blood it may not respond to stimulation and the person is asphyxiated. This nerve center may also be numbed by injury. The fetus in the womb requires no air, for the placental blood furnishes oxygen and removes the fetal waste. Hence the fetus makes no effort to breathe. If the interchange of blood from the placenta to the fetus be interfered with in any way the fetus may be excited to make breathing movements, or it may be so gradually poisoned that the respiratory center is numbed without first being sufficiently excited to cause respiratory movements. The fetal circulation may be disturbed either by interfering with the cord or the placenta. The circulation in the cord may be

stopped by pressing upon it, as, for example, in cases of prolapse of the cord, when it will be compressed between the head and the pelvis or by a knot in the cord. The placental circulation may be disturbed by a partial separation of the placenta from the uterus. This may happen from an injury, such as a blow upon the abdomen or from a wrong position of the placenta, as in placenta previa. The placenta may also be injuriously compressed by the contractions of the uterus during labor. If from any of these causes the fetus suffers it may become so asphyxiated that it makes no effort to breathe and is born in this condition, or it may try to breathe before birth, when it will aspirate into the mouth and air tubes the water and mucus from the genital tract. We may therefore have the child asphyxiated either with or without mucus in its throat. Still another cause may have produced the asphyxiated condition, namely, injury to the brain either during a hard labor, where there is much compression of the head in the obstetrical canal or by forceps.

Treatment.—Two degrees of asphyxia are generally distinguished: asphyxia livida, or congestive asphyxia, and asphyxia pallida, or pale asphyxia. In the first case it is generally possible to excite respiration by stimulating the surface of the body, while in the second case stimulation may not be effective, and it is necessary to force air mechanically into the lungs. Remembering these conditions and factors, we adopt the following procedure in bringing-to or resuscitating an asphyxiated child:

Slapping.—First we lift the child from the bed with its head down, grasping it with the left hand by the feet, holding one leg between the thumb and forefinger and the other between the fore and middle fingers. The child is held in this position to cause the blood to flow to the brain and also to empty from the lungs and air tubes any liquid that may have been drawn in. Then the child is slapped gently on the buttocks with the right hand.

Removal of Mucus.—If this does not excite the child to breathe it is laid on its back on the bed and the attendant takes an aspirating catheter and inserts it into the throat,

holding the tongue forward with the forefinger of the left hand. The catheter is often but wrongly called a "tracheal" catheter. No attempt should be made to carry it through the larynx into the trachea. It should be always on hand and ready for use. As soon as it is inserted the attendant



FIG. 102.—Suspension and slapping of asphyxiated infant.

applying the mouth to the outer end draws into the tube what mucus and liquid can be obtained and then the catheter is withdrawn and the contents blown out. It is then reinserted and again used as before. When no more fluid is found in the throat the child is again raised by the feet as

before and another effort made to excite respiration by gently slapping the buttocks.

Hot and Cold Bath.—If this last attempt is unsuccessful the cord must be at once tied and one more effort made to excite the brain center by another kind of superficial stimulation. The body is first held for a few seconds in a large pan or tub of warm water, temperature 100° F.,



FIG. 103.—Removal of mucus with an aspirating catheter.

and then placed for an instant in a tub of cold water as it comes from the hydrant or cold water from a pitcher is poured over the child. Then it is changed back and forth from the warm to the cold water a few times until the child begins to breathe or there seems to be no longer any hope from this method.

The nurse will see the great importance of being prepared for these efforts to revive the child. Should she be

alone with the patient she ought to make all the preparations in every case so that she be not taken unawares. The baby's bath-tub and a large bowl, or perhaps a wash-tub, answer very well. For the cold water the stream from the faucet of the bath-tub or the sink may be used.

Laborde Method.—Another method of reflex stimulation is the intermittent traction on the tongue, which was originated and described by Laborde. The tongue is grasped with a suitable tongue forceps or with the thumb and finger between layers of gauze. It is then pulled out carefully



FIG. 104.—Laborde method of artificial respiration. Grasping the tongue with small tongue forceps.

as far as possible and held for a second, when it is released. These tractions should be made about fifteen times to a minute, and may be continued for that length of time.

If the methods for exciting respiratory movements already described be unsuccessful the nurse should apply her ear to the baby's chest and listen carefully to determine whether there is any heart pulsation. If any beating of the heart is heard, no matter how faint, slow or irregular, she should at once take means to get air into the lungs. Even when she is doubtful whether the heart beats at all or not, she would better use artificial respiration for a few minutes.

Several methods of filling the lungs with air will be described.

Byrd Method.—In the Byrd method the child is held so that the right hand supports the upper part of the trunk, the head resting between the thumb and forefinger, while the left hand holds the lower part of the trunk and the breech, the left leg resting between the thumb and fore-



FIG. 105.—Byrd method of artificial respiration. Inspiration.

finger. If desirable the child may remain in the warm bath during the manipulations. By rotating the thumbs outward or the ulnar bodies of the hands upward a dorsal flexion of the child is made which tends to expand the chest cavity and draw air into the lungs. The reverse rotation is then made with the hands, which flexes the child and presses the air out of the lungs. These movements are repeated about twelve times a minute until the

child begins to gasp. As soon as voluntary respiratory movements begin the nurse should endeavor to time the artificial movements to correspond with the voluntary movements.



FIG. 106.—Combined Byrd method of respiration. Expiration.

Sylvester Method.—In the Sylvester method the child lies on its back on a table with a small blanket under the shoulders. The nurse first seizes the arms and draws them above the head, causing inspiration. She then returns them to the sides of the chest and compresses it, causing expiration. These movements are also made about twelve times a minute.

Combined Byrd and Sylvester Methods.—If there be two persons to care for the baby the two methods just

described can be combined. The second nurse extends the arms of the child while the other makes the first or inspiratory movement with the Byrd manipulation. Then she brings them to the sides of the chest and helps compress it during the expiratory flexion. This can be done with the child in the bath.



FIG. 107.—Combined Byrd and Sylvester method of inducing respiration.
Inspiration.

Schultze Method.—The accompanying figures illustrate the Schultze swingings, which are made in the following way: Standing with her feet apart the nurse holds the child with the open hand supporting the back, the index fingers in the axillæ under the arms, the thumbs over the shoulders and in front of the chest. The infant tongue forceps, which may be used to keep the tongue forward to prevent closure of the throat, is caught and held by the

thumb. Starting from the first position, where the nurse bends slightly forward and holds the body hanging down, she then straightens her body and swings the child so that legs and thighs are flexed on the chest. This movement contracts the chest and is the expiratory movement. It also favors the brain circulation. Then the child is swung back to its first position. This expands the chest and one



FIG. 108.—Combined Byrd and Sylvester method of respiration.
Expiration.

can frequently hear air rush into the lungs. Complete swinging up and down should take six to eight seconds. The swinging should be repeated if necessary ten to twelve times, when the child should be immersed in a warm bath to prevent it from becoming chilled through.

When the method is carried out according to the directions given it is very efficient, and by it air can be forced into

the lungs of a dead child. Of course it is very important that no accident happen, for example, that the child does not hit a piece of furniture in swinging and that it is not allowed to fall. The nurse should practice with a dead child or, if this is impossible, with a large flexible doll until she feels competent.



FIG. 109.—Schultze swinging. Inspiration.

Insufflation.—The breathing of air into the baby's lungs is done in the following way: The child, laid upon its back with the air passages free from mucus, is grasped with the right hand around the waist below the chest, the thumb

pressing firmly over the stomach. Its lower jaw is raised with the thumb of the left hand and the lips opened with the fingers. Then the nurse applies her lips to the baby's mouth and blows slowly and carefully. One or two layers of gauze are first laid over the mouth to protect the nurse



FIG. 110.—Schultze swinging. Expiration.

from a possibly diseased child and to protect the child from possible infection by the nurse. The chest is now grasped with both hands and compressed to expel the air. The lungs are filled and emptied in this way ten to twelve times or until the child breathes, and then it is put back into the

warm bath as described before. By this method, the filling of the stomach and bowels with air is generally avoided. Care must always be taken not to blow too hard, for there is danger of rupturing the air cells and forcing the air into the tissues around the chest and neck.

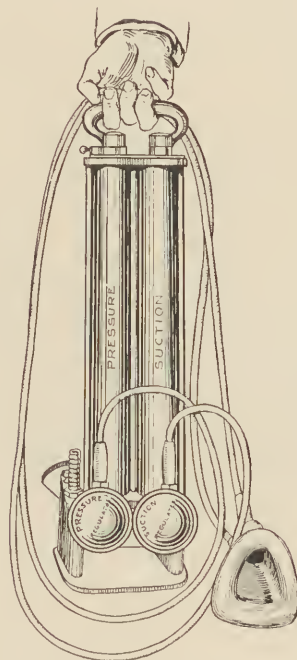


FIG. 111.—The lungmotor.

Oxygen Insufflation.—Many hospitals are provided with an apparatus by which oxygen can be insufflated through the air passages into the lungs. (Fig. 111.) The pump is connected with an oxygen tank, the gas container made large enough to hold the proper amount for an infant and the mouth piece fitted firmly around the mouth and nose. The pump is then worked twelve to fifteen times a minute

in combination with synchronous, artificial, respiratory manipulations on the chest.

The order in which these movements should be employed may vary. One may alternate the insufflation method or the Laborde method with the Byrd method, keeping the child in the warm bath. Generally the Schultze swinging is the method of last resort.

When the child begins to breathe we may desist from artificial respiration, but it must be watched carefully for some time. Although the immediate danger from asphyxia is past when the child has cried vigorously and breathes with regularity, yet its future depends upon the amount of injury to the brain and upon the after-treatment. Children rescued from pale asphyxia frequently die within forty-eight hours in spite of careful watching.

Protecting the Child Before Separation from the Mother.

—When the child is born it still remains connected with the mother by means of the placenta and cord. The pulsations generally continue in the latter five or ten minutes. Some think it desirable to delay the cutting of the cord until the pulsations cease, because by so doing the child receives more blood from the placenta than when the cord is severed immediately after birth.

It is therefore important that the child be properly protected during the period when it has to lie in the mother's bed between her thighs. There is always present after birth some fruit-water and frequently blood, so that unless the child is properly cared for it will become wet and cold even if it does not draw the fluid into its lungs. The change in temperature to which the tender child is exposed for the first time in its life is perhaps 25 to 30 degrees, and sufficient to chill it seriously.

A blanket 1-yard square lined with a cotton sheet of the same size which has been enclosed in a sac with four large safety pins and sterilized should have been warmed ready to receive the baby. After the patient is delivered the water and blood are removed with the obstetrical pad or sheet, a dry one is inserted if necessary, and then the sterile blanket is removed from the sac and wrapped and fastened

about the child. If it is breathing properly and there is no hemorrhage or other condition on the mother's side calling for immediate separation of the baby it may lie as long as necessary.

First Care of the Eyes.—The eyes should be attended to during this period of waiting for the cessation of the cord pulsations. Some physicians use a boric acid eye-wash, but it probably has no value and would better be omitted. If it is certain that the mother has neither a fresh nor a latent gonorrhea the wiping of the face after the birth of



FIG. 112.—Credé instillation of silver nitrate solution to prevent ophthalmia neonatorum.

the head is sufficient. Ordinarily it is safer to use a silver nitrate solution in the eyes and this is required by law in many States and should be the practice of the nurse in the absence of the physician or when he has given no direction. This method of preventing gonorrheal sore eyes of infants was advocated by Prof. Credé, of Leipzig, Germany, and therefore is called the Credé treatment, or instillation. The solution formerly used had a strength of 2 per cent. In this country we generally use a 1 per cent solution. One or two drops are put in each eye. The lids must be

opened and the solution dropped with an eye dropper into the eye. The lids are then wiped off with cotton.

Tying of the Cord.—As soon as the pulsation ceases the cord is tied and cut. Sterilized tape or silk ligature is furnished in an envelope in the outfit already prepared (see page 126). If not prepared a narrow tape or silk or linen thread can be sterilized by boiling. The ligature must be tied tightly and should not be too fine, else it may cut through the soft cord, severing the bloodvessels as with a knife, and causing fatal hemorrhage.

The first ligature is tied 1 inch from the child so as to leave room for another ligature next the body if the first should slip or cut through. Then the second ligature is placed 1 to 2 inches nearer the mother and the cord is cut with a pair of clean scissors about $\frac{1}{2}$ inch from the first ligature. The object of the second ligature is to prevent the blood in the cord from soiling the bed and, in case of twins, prevent bleeding from the second child through a common placenta. Many physicians tie the cord at the skin junction and cut it so as to leave only a thin button that later retracts and gives no trouble in the dressing. On account of the possible danger of bleeding the nurse may hesitate to use this method. For the further management of the cord and care of the mother see page 164.

After the cord is tied and cut the baby is taken away to a previously prepared warm bed, there to be left until the mother is attended to. It is well to lay the head somewhat lower than the body to allow mucus or other fluid to gravitate from the throat and prevent choking by its aspiration. It is not necessary to place the child on either side because of any supposed possible influence of position in helping the change from fetal to extra-uterine circulation.

The Condition of the New-born.—The most important facts concerning the condition of the fetus at the end of gestation have been given in Chapter II. Here we must consider the condition of the new-born, especially noting how it has been affected by the forces acting on it at birth as well as a few of the more common pathological conditions not due to labor.

Mature infants differ much in weight and length on account of differences in the size of the parents and other causes not always well understood. It may be said, however, that a weight of 7 pounds and a length of 20 inches are about the normal average. The body is more or less covered with the vernix caseosa, a creamy coating consisting of exfoliated epithelium from the skin and the secretion of the sebaceous glands. The lower part of the body is frequently stained with meconium which is passed shortly after birth and sometimes before the child is outside of the genital canal. This meconium is a dark yellowish-green, tar-like substance that is composed of exfoliated epithelium of the mucous membrane of the intestines and bile salts and also exfoliated epidermis, hair, and other contents of the liquor amnii that have been swallowed by the fetus. The amount is generally about 3 ounces, and it is all evacuated in two to four days. It is sterile at birth, but in the course of twenty-four hours it contains a number of kinds of bacteria, among them the colon bacillus, which becomes a permanent resident in the intestinal tract during the life of the individual. Rarely a mucous plug, called also the meconium plug, closes the rectum and comes away before the meconium can escape.

The urine likewise may be voided soon after birth. This urine differs from the urine secreted later in containing a considerable quantity of uric acid, which not infrequently occurs as a reddish "brick-dust" deposit. This may cause pain during its passage through the ureters into the bladder or in the urethra when leaving the bladder. Also the urine for the first few days contains albumin.

The respirations vary according to the circumstances of birth. The pulse is perhaps a little slower than that of the fetus, from 120 to 140 a minute. The temperature is the same as the interior of the uterus, that is, about 99° F. As a rule the eyes are opened within a short time after birth. The movements of the eyes are chiefly reflex instead of voluntary, and for a few days the movements of one eye do not necessarily correspond with those of the other; hence the mother need not be worried because the new-born

is cross-eyed. Also the bow-legs of a child need cause no worry, because they result from the attitude of the fetus *in utero*.

The first inquiry of the mother is always to learn if the baby is all right. The prevalent belief in maternal influence is the cause of anxiety on the part of the mother, for nearly every woman during pregnancy sees some object or has some impression that she fancies may mark her child (see page 64). The marks and deformities that we sometimes find are either fetal tumors or they come from an error in the development of the fetus because of a restricted or an excessive development. The effect of too little liquor amnii and the resulting compression of the fetus has already been mentioned (page 65).

Nævi are marks of various kinds on the skin of various appearances. Some are much better supplied with blood than others. Most commonly they are merely superficial or stain-like spots and are frequently seen on the eyelids or over the forehead and show more prominently when the child cries. This variety usually disappears in time without treatment. Others are more markedly vascular, sometimes strawberry-like in appearance, and may need to be removed by caustics or other treatment.

Malformations.—Deformities that result from errors in the development of the fetus are called malformations, and when the individual is considerably deformed it is called a monster. When parts of two individuals are joined we have a double monster; otherwise, a single monster. An example of restricted development in the region of the back is a spina bifida, which is due to the fact that the spinal canal that was originally formed from a groove has failed to close. Failure in the closure of the skull leads to various brain and meningeal tumors if the skin or any covering persists. If the covering is lacking the rudimentary brain or the base of the skull is exposed. Another example of non-union of parts of the head is found in cleft palate and hare-lip. A failure in the closure of the anterior wall of the body may result in exstrophy of the bladder, where the inside of the bladder is exposed. A failure in the

closure of the umbilical ring leads to a large umbilical hernia, where some or all of the intestines and other abdominal viscera may lie outside of the body. Sometimes this may be cured by operation. The imperfect development of the genital or anal tract may lead to an imperforate anus, vagina or urethra. It is therefore important that this condition should not be overlooked, for it demands immediate operation to relieve the bowels or kidneys. Sometimes one or both limbs are absent. A not very uncommon deformity is the change in the position of organs, a common example of which is the undescended or hidden testicle, which is in the abdomen or groin instead of the scrotum. This organ originates in the region of the kidney and gradually descends through the inguinal canal into the scrotum, and stoppage in the descent leads to the abnormality. As a case of excessive development we might mention polydactylism, or the occurrence of more than the usual number of fingers.

Moulding the Head.—The head of the new-born is almost always moulded more or less as it passes through the pelvis of the mother (see page 117). The moulding is rendered possible by the way the bones of the skull are loosely joined together by the membranous sutures and fontanelles. These sutures allow the bones to overlap. One of the parietal bones is often pushed under the other, while the occipital bone and frontal bones may be pushed under the parietal. In the usual presentation, with the occiput anterior, the head as it passes through the vulva will be most compressed at the circumference that passes under the occiput and around the forehead and elongated in the direction at right angles to the plane that passes through this line.

Caput Succedaneum.—In addition to the moulding of the head thus produced there is also a swelling of the tissues that cover the foremost part of the head. This swelling is often formed while the head is still in the uterus, and is called the caput succedaneum (see Fig. 52). In other presentations, as in face or breech presentations, the shape of the head is very different. The deformity of the head generally disappears in two or three days and requires no interference.

Cephalhematoma.—Hemorrhage between the periosteum and the skull bones causes a soft tumor limited to the region of the bone which it covers. This is called a cephalhematoma. It lasts much longer than a caput, but requires no interference.



FIG. 113.—Anterior view of cephalhematoma, showing sharply defined border of swelling. (Peterson.)

Birth Injuries.—Injuries at birth are the cause of death in over 10 per cent of the children that die during the first week of life. Over 10,000 children are lost every year in the United States from this cause. Many of these deaths are due to intracranial hemorrhage frequently caused by fracture of the skull arising in instrumental deliveries. Death may also be due to prolonged labor and may have occurred before instrumental interference. A much larger number of children are injured but do not die. These injuries are a frequent cause of convulsions in the new-born.

When forceps are used in the delivery of the child the

marks of the blades are frequently seen on the head. Sometimes the blades cut through the skin making wounds that may require dressing and may leave permanent scars. A not uncommon result of forceps is a temporary paralysis of one side of the face; sometimes the bones are broken. Other injuries may be due to the extraction of the child by the feet. Fracture of the arms, of the collar bone, of the thighs, etc., have occurred. These facts show how important it is that the nurse should examine the baby very carefully and report any seeming abnormality to the physician.

The Skin.—When the child is born there is a remarkable change in its environment. In the womb the skin, as also the whole body of the fetus, is protected from irritation of all kinds. Outside, every organ and tissue of the body is subjected to new and often harmful influences. In particular the skin is exposed to many traumatic and other irritations and to infection. No wonder that the child soon becomes red all over the body. Ordinarily this erythema soon disappears as the protective epithelial covering becomes able to withstand the new influences affecting it. Frequently, however, more or less eruption appears, sometimes vesicular and sometimes pustular. This is more common on the neck or face or around the genitalia or buttocks, since these regions are the ones most exposed to infection. The less the skin is exposed to contact with dirty hands or clothes the less is the infection. The erythema ordinarily needs no treatment except cleanliness. A small vesicular eruption may be helped with a mild soda bath. Pustules, however, must be carefully treated to prevent extension of the infection to other parts of the body, and especially to the breast of the nursing mother (see page 251). They should be opened under alcohol with a sterile needle and after evacuation of the pus touched with a very small amount of tincture of iodine on a swab.

Sometimes a well-marked eczema develops in the perineal region, due to the lack of care in cleaning the child or to irritating stools. This is called intertrigo (see page 293 for management). An eczema of the face may also appear during the first weeks of the child's life while it is still under

the care of the obstetrical nurse. This may be caused by improper feeding which must be corrected. Meanwhile a protective soothing ointment is prescribed.

Jaundice or Icterus.—A certain amount of discoloration of the skin is found in a majority of the new-born during the first two or three weeks of extra-uterine life. Its cause is not known. Perhaps it is due to a number of causes, among which are destruction of blood cells, changes in the liver functions, etc. It is of no importance and requires no treatment.

When the jaundice is due to infection from the navel wound it is a sign of a more serious trouble. Hence in all cases the condition of the navel should be noted and if signs of infection are present they should be reported.

Catarrhal jaundice from an inflammation of the gall duct may occur and also jaundice from a congenital stricture of the duct. These cases, of course, demand the attention of the physician.

The Bath.—The outfit for the baby's bath consists of the tub, bath thermometer, wash cloths, soap, oil, and towels. The best kind of tub is that made of enamelware. Although the first cost is high it is very durable and will last for two or three generations. One great advantage is that it can be kept clean. A tub 28 inches long will answer for one year, when the child can be bathed in a larger tub. For those who cannot afford the enamelware tub a tin tub, sold in all the department stores, will answer very well if not allowed to rust. For anyone travelling, rubber tubs which can be folded up may be used. These are not durable and cannot be well cleaned.

The common bath thermometer enclosed in a wooden frame is cheap and should be in every house. The determination of the temperature of the water by the hand, which is often insensitive to hot water, is too unreliable and has often led to the use of the bath so hot as to seriously injure the tender skin of the infant.

Squares of gauze, cheese-cloth, or soft Turkish towelling are best for wash cloths, and should be prepared beforehand.

The genuine imported Castile soap or a good quality of unscented toilet soap should be used.

Pure sweet or olive oil is used before the first bath to remove the vernix caseosa.

A large soft Turkish towel, at least $1\frac{1}{2}$ yards square, should be provided to wrap the baby in as soon as it is removed from the bath. Two smaller linen towels should be provided, 1 for the face and 1 for the better drying of the creases between the thighs, etc. Clean gauze may be used in place of the latter.



FIG. 114.—Baby's bath.

It is well to give the bath in some other room than the lying-in chamber. The temperature of the room where the child is bathed should be about 85° F., and this heat is enervating to the mother. In most houses the bathroom is most convenient. If any difficulty arises in heating it sufficiently, filling the large bath-tub with boiling water quickly raises the temperature as much as is needed. The baby is often harmed by letting it become chilled in the first bath. This is one of the reasons why some physicians prefer to omit the bath for a few days, simply oiling the child and wiping it off.

Before beginning the nurse should see that everything needed for the bath, as well as the clothing and navel dressing, are in readiness. The bath-tub should be placed on a low stool in the bath-room; the closet seat makes a good holder for the tub. The nurse sits in a chair beside the tub. Sometimes a kind of platform is made to fit over the large bath-tub on which the baby's tub can be placed. Another good plan when the room is large enough is to use a table for bathing and also for all washing of the baby. The bath-tub is placed on the table. The nurse stands while bathing the child and then lifts it out of the tub into the towel lying at the side of the tub. Here it is dried and dressed. Whatever the arrangements, it is important that the nurse adopt the best and easiest method of bathing and caring for the child, since she is an example for the mother, by whom it is very desirable that awkward, back-breaking methods be avoided.

The bath-water should have a temperature of 98° to 99° F., that is, it should be blood-warm. After two to three weeks it may be two or three degrees colder. Enough water should be used so that the baby's body may be completely immersed.

The face should be washed first and wiped before the child is put into the tub; then the body should be well soaped, especially the folds in the neck, in the groin, between the thighs, in the axillæ, etc. The soaping should be well done and the wet cake may be rubbed over the skin. Before the first bath oil is freely used, beginning with the head, to help in the removal of the vernix caseosa, after which soap is employed. After the soaping is done, the child is put into the water, and rubbed well with a wash cloth or the hand. When it is taken out of the bath it is wrapped in a towel and well rubbed. All the flexures, and especially the genital region, are particularly well dried with an extra towel; then it is ready for the navel dressing and its clothes.

If washed and dried as directed there will be no need of a powder. As a rule powders lead only to carelessness and laziness. Generally the child is left wet and a large mass of powder is sprinkled on, when it forms a thick crust. If the baby should be very fat and any trace of soreness seem to indicate a powder, an unperfumed borated talcum powder

would do, but it should be sprinkled on very thinly and any excess wiped off.

When the baby is dressed in a sensible way the bathing and dressing should not take over fifteen to twenty minutes. The best time for the daily bath is about nine or ten o'clock in the forenoon, just before a nursing. Since the bath and nursing which follows generally conduces to sleep, it may sometimes be well to give the bath in the evening if the baby does not readily go to sleep. Occasionally it is better to give two baths a day. Since all the clothes worn during the day should be changed at night, and since the child should be washed, between the thighs at least, at bedtime, and as it will add but five or ten minutes' work to give it a bath, both an evening and a morning bath may be desirable. In hot weather especially, the evening bath is very refreshing and almost necessary to the comfort of the baby.



FIG. 115.—Cleaning the baby.

Cleaning of the Perineal Region.—The washing of the child after the bowels move is very important, for if it is neglected or done in a slovenly way, the baby is apt to become sore. Moreover the germs that are in the feces may cause an infection of the vulva and vagina which may ascend

through the urethra into the bladder and even into the kidney. For a proper washing are required: Plenty of water, a piece of rubber cloth over which is laid a napkin, a bowl of warm water, soap, absorbent cotton or gauze sponges, a towel, and clean napkins. The baby can never be properly washed while held across the lap, and the position is back-breaking for the nurse or mother. It may be cleaned on the bed or on a table. If the bed is used the nurse should sit in a low chair, having at her right hand on a table the things needed. The child is laid on its back with its head away from the nurse. The napkin is removed and, holding up the feet with the left hand, the thighs are flexed onto the body and the rubber cloth is inserted under the hips. Then with a cotton sponge, using plenty of water, the buttocks and anal region are thoroughly cleansed, soap being used when necessary. The nurse should never wipe upward from the anus toward the vulva. After washing the baby is carefully wiped and the clean napkin put on. If a table is used (Fig. 115), the nurse places the baby in the middle and has the basin of water and sponges and napkins conveniently at her right hand. Instead of a rubber cloth to protect the bed and a thick napkin to absorb the water, some prefer to insert a bed-pan so that there need be no restriction in the amount of water used.

Sometimes the baby has very numerous small passages that frequently are quite irritating. These may require a washing out of the bowel or some other treatment as ordered by the physician. Special attention to cleanliness is needed and sometimes a protecting salve. Should a baby be washed after each passage of urine? This is not necessary when it is cleaned as described after the bowel movements. If the nurse watch the baby carefully, she can generally tell from its actions when it is wet, and then she should remove the wet napkin and apply a dry one at once. At night the napkin need not be changed when the baby is asleep.

It is a common practice to dry the napkins and use them the second or even the third time, because of a scarcity of napkins or to economize in washing. At the same time the mother has probably provided a large wardrobe of fancy

lace dresses, any one of which has cost more than two dozen napkins, and the washing and ironing of which will more than offset the washing of the napkins.

Care of the Navel.—After the bath comes the dressing of the navel. The cord dries up in a day or two and separates in from four to fourteen days, leaving often a slight raw surface which covers over with epithelium in a few days more. The object of the dressing is to protect the navel from injury that might be produced by the catching and pulling of the clothes and to prevent its infection. Infection of the navel is not uncommon and frequently causes fever and other sickness. A baby eight days old has been known to die of lockjaw where the germs of the disease were found on the navel. This infection probably came from some contaminated cloths used in dressing the cord. When the baby is born it is absolutely sterile. It would be possible to put on an aseptic dressing that would keep out all germs until the navel wound healed. Such a dressing is, however, complicated and would involve considerable care and expense. It is not necessary, for it is possible to manage the navel wound antiseptically so that no harm will result. The following method is recommended:

Remembering that the place where infection occurs is where the cord separates from the body, this region should be thoroughly washed with alcohol, the only efficient and non-poisonous disinfectant. A towel or some dry cotton is placed over the pubes to keep from the genitals the alcohol which is poured over the navel. A little cotton saturated with alcohol may also be wound around the piece of the cord and left in place for two or three minutes. Then clean absorbent cotton is wound around the cord so that the sore is well covered. The cord is turned over to the left side and held in place with a flannel bandage about 4 inches wide and 24 inches long. This dressing is, of course, removed whenever the baby is bathed. If it should stick it will soften and come away when the baby is put into the water. Some physicians prefer to leave the dressing on the cord until the latter falls off, and hence give a sponge bath until this occurs. If this practice be followed, it is especially necessary to clean

the junction between the cord and the body. If the cord is cut short (see p. 284), no dressing is needed except a little sterile cotton. Alcohol is poured into the depression containing the short stump of cord after the bath, and at other times if there is any redness or odor.

No powder is necessary on the navel. Boric acid and bismuth have very little antiseptic value and generally form a crust or scab under which suppuration goes on undisturbed. After the cord has come away the wound is cleaned and cared for in the same manner until all discharge has ceased. It is important not to allow the depressed wound to become covered with a scab, under which bacteria grow. The bandage is only for the purpose of holding on the dressing and is discarded as soon as the wound is healed. It is probable that it has no effect in preventing umbilical hernia and may possibly favor its occurrence if it constricts the abdomen.



FIG. 116.—Application of adhesive strap for umbilical hernia.

Umbilical Hernia.—If the navel opening in the abdominal wall does not contract well a protrusion of the omentum or bowel may occur constituting an umbilical hernia. This is favored by much crying or straining, but it is due to a primary or congenital weakness and is not the result of any mistake in the dressing of the cord. It will generally disappear spon-

taneously, but if it is troublesome a strip of adhesive plaster 2 inches in width should be applied so as to bring the abdominal walls together and close the opening. No button or other wedge-like body should be used, for it would only tend to keep the ring open. The plaster strip must be left in place for several weeks and perhaps a fresh strip must be used if the first comes off. While this dressing is in use the body must be cleaned with a sponge bath.

Care of Genitalia.—In the female infant the vulva and the vagina not infrequently become infected and there is vulvo-vaginitis, characterized by redness, swelling, and more or less purulent discharge. Generally the infecting agents are the common pus bacteria or the colon bacilli. Sometimes gonorrheal germs are present, coming possibly from the contaminated vagina of the mother during the birth or more often brought to the genitals by the nurse from gonorrheal contaminated lochia, or from gonorrheal ophthalmia. Practically all genital infection of the child is due to careless handling, bathing, or cleaning. The nature of the infection can be determined with certainty only by a bacteriological examination.

The infection may not be confined to the vulva or lower part of the vagina. It sometimes ascends through the short urethra into the bladder and up the ureters even to the kidneys. This infection may subside after a few days or weeks and remain latent for months or years to reappear later as chronic or intermittent pyelitis or cystitis.

The prevention is care in cleaning the perineal region of the child (see p. 293). If infection has already occurred it may be necessary to use argyrol or some other antiseptic.

Menstruation in Infancy.—Occasionally a slight bloody discharge is found coming from the vagina. Sometimes a red uric acid deposit is mistaken for blood. When the discharge really contains blood it may be due to injury or it may be allied to a menstruation. It does not reappear and needs no treatment except cleanliness.

Adherent Foreskin.—In the male child the foreskin or prepuce is more or less adherent to the glans. Sometimes the foreskin is long and extends considerably beyond the glans.

When the opening is very small we have the condition called phimosis. Drops of urine may be retained in this foreskin canal and eventually cause irritation. Occasionally a considerable amount of smegma is collected under the prepuce just behind the glans, and this may also become a source of irritation.

For the sake of keeping the foreskin and glans clean the adhesions between them may be broken down with a probe and the foreskin retracted until it is perfectly free from the glans. Then it is again pulled back to its proper place. To accomplish this it may be necessary to dilate the foreskin.

The nurse should never undertake to retract the foreskin. This is an operation and must be performed by the physician. Improper interference may lead to injuries and infections. Sometimes when forcible but unskilled manipulations are made by the nurse the foreskin is retracted behind the glans and then contracts as a tight ring, the glans swells, and it becomes impossible to replace it. This condition is called paraphimosis. The same rule applies to the penis as to the breast: Let it alone.

If the physician dilates and retracts the foreskin he may expect the nurse to dress the child, that is, repeat the manipulations daily. For the first two or three days there may be some difficulty, and it is important that the nurse very quickly pull back the foreskin after retracting it. An application of sterile vaseline on the probe or with cotton aids in the procedure.

Circumcision.—Sometimes the foreskin is removed by circumcision. This operation is also practised as a religious rite by some sects and races. The operation is made in different ways and the physician will say what instruments are needed. The nurse must prepare a table in a good light and cover it with a clean sheet. She must also furnish a basin with an antiseptic solution and sponges, sterile towels, and sterile petrolatum or oil. The child is undressed and cleaned and then held by the nurse while the physician operates. Often the child is given a half teaspoonful of brandy in sugar-water as an anesthetic.

After the circumcision the nurse must watch the child closely for two or three hours for bleeding.

Undescended Testicles.—The testicles, like the ovaries, originate in the abdomen and gradually descend during fetal life. They finally pass through the inguinal ring and before birth reach the scrotum. Sometimes this descent is interfered with and the testicles remain in the abdomen or in the inguinal ring. As a rule no immediate treatment is instituted, but the condition should be noted and perhaps extra care used to avoid hurting the testicles lying in the groin.

The Breasts.—There is a certain amount of swelling, glandular development, and functional activity in the breasts in nearly all children of both sexes during the first two weeks of extra-uterine life. The excretion ("witches' milk") that can be expressed is similar to the colostrum found in the mother's breast during pregnancy and immediately after labor (see p. 242). Sometimes the swelling is so considerable as to cause anxiety to the mother or uninformed nurse and lead to efforts to empty the breast by manipulation or to the use of compresses. These measures may result in infection and serious injuries, and are quite unnecessary. The breast should be left alone. At most a protective band might be applied.

Care of the Mouth.—The common practice of swabbing out the mouth daily with a cloth on the end of the finger is objectionable. If the mouth were infected, such a washing could not clean it, but would probably increase the infection by rubbing off the epithelium from the tender mucous membrane of the mouth. It is unnecessary, for the mouth of a healthy child will clean itself. Of course, particles of regurgitated milk may be removed.

Bednar's Aphthæ.—This is due to infection and ulceration of abrasions at the junction of the hard and soft palate which have been caused by "mouth washing." It is painful, interferes with nursing and may lead to a serious condition.

Thrush.—Thrush is an infection of the mucous membrane of the mouth and sometimes of the throat with a fungus that grows in colonies from the size of the head of a pin to $\frac{1}{4}$ of

an inch in diameter. It comes from the introduction of germs into the mouth in washing it or on the nipple or sugar teat that is given the child to pacify it. It is more apt to appear in children whose mouths are washed than in those left alone. If the child is weakly, thrush may be difficult to cure and sometimes leads to bowel and intestinal disturbances. The treatment is local and general. Before each nursing the child is held in a good light and the mouth carefully exposed. The nurse has prepared a number of sterile cotton swabs on toothpicks; with these wet in sterile water she rubs off the patches. No solutions are necessary, only constant attention for a few days. Meantime the child must be well nourished and the bowels must be kept in good condition.

Tongue-tie.—When the frenum, the membranous band that attaches the under surface of the tongue to the floor of the mouth, is inserted well forward to the tip of the tongue it limits its free motion and we have the so-called tongue-tie. Very rarely this may interfere with nursing, and later in life with good articulation. The physician corrects it by cutting the band with scissors.

Care of the Nose.—Sometimes a little dried mucus may collect in the nose. This may be removed carefully with a moist sterile swab. Otherwise the nose needs no routine attention.

Not infrequently a mild infection of the nasal passages leads to a slight catarrhal discharge. The child has the "snuffles." It breathes with some difficulty, especially when nursing. The infection may come from contamination, perhaps with lochial germs in washing the face or by unnecessary swabbing out of the nose. The infecting agents are generally the pus germs sometimes pneumonia or grip germs and rarely gonococci. The influenza and pneumonia germs may come from a nurse or other person who is suffering with a bad "cold." The method of prevention follows from a consideration of the cause. The treatment generally consists in keeping the passages lubricated with a drop of liquid petrolatum dropped into the nose as necessary.

Vomiting.—Vomiting in an infant is generally the regurgitation of unchanged milk during or shortly after nursing. Sometimes the milk may be curdled and there are signs of indigestion. This is most frequent in artificial feeding. Rarely vomiting may be due to an obstruction in the pylorus or to other causes. In the first case the regurgitation is generally of little importance. The duration of nursing may be lessened and the infant should also be kept quiet after nursing. When there are signs of indigestion the physician will examine the vomit and the milk and may modify the feeding or give some antacid or digestant.

Diarrhea.—As a rule, within twenty-four hours after feeding begins, the milk feces appear mixed with the meconium, forming the “milk stool.” In a short time the meconium disappears entirely and the intestinal excrement is henceforth the feces. It is much thinner than meconium, has a bright yellow color, and is fairly homogeneous. Frequently, however, small curd-like masses appear and also pieces of mucus.

Besides the colon bacillus, which lives mostly in the colon and rectum, other important germs live in the small intestine. In babies fed on breast milk the most common bacteria are the *Bacillus bifidus* and the *Bacillus acidophilus*. In those fed on cows' milk an important germ is the *Bacterium lactis aërogenes*. This germ is a gas producer and, like the colon bacillus, probably is a not unimportant factor in digestion.

Ordinarily the new-born has from two to four stools a day. Sometimes, however, the stools are more numerous, frequently a small passage after each nursing. This is not generally of much significance. A small enema or a dose of castor oil to clean out the bowel and prevent irritation from its contents is sufficient to correct the slight trouble. If the stools become quite green on passage, contain mucus, are acrid and cause much pain and perhaps a little fever, we have a distinct pathological condition. Some fault in the feeding is suspected, especially if there has been any artificial feeding. Harmful germs may have got into the intestine and succeeded in overcoming the colon or lactic bacteria which help protect the body from the pathogenic micro-

organisms. The treatment is generally to stop feeding for a day or two, giving only water or barley-water and cleaning out the bowel with castor oil or enemas or both.

Castor oil is often given in teaspoonful doses. Some physicians favor giving 10-drop doses frequently repeated.

For giving an enema a 3-ounce ear syringe made in one piece of soft rubber is satisfactory. A catheter or small rectal tube attached to a funnel may also be used. The ordinary fountain syringe and the bulb syringe are not so good.



FIG. 117.—Giving enema to baby with funnel and tube. The soft-rubber bulb syringe, shown on table, may also be used.

Constipation.—Occasionally a new-born infant will have only one stool a day and sometimes none without help. This may be due to a deficiency of fat in the food or perhaps to a deficiency in the amount of food. Besides correcting the cause, if possible, it may be necessary to assist the baby to secure at least one bowel movement a day. It is well to begin to establish a habit and secure a movement before the daily bath. A small salt-solution enema may be used or a soap

suppository. Frequently the introduction of a thermometer into the rectum is sufficient to start the movement.

Colic.—Etymologically this term means an affection of the colon. Practically it means an acute paroxysmal pain of any kind. Applied to infants it means either intestinal colic or else that due to the passage of urinary calculi through ureters or urethra. This can sometimes be diagnosed by finding that the pain occurs when the red uric acid deposit passes from the bladder. Intestinal colic is due to irregular, cramp-like contractions of the bowel.

Very few babies escape colic entirely. Sometimes it is very persistent and makes the most important complication of a case. In intestinal colic there is generally some fault in digestion, but it is often impossible to determine definitely the causes. If the baby gains in weight in spite of its crying, the mother may be assured that there is no danger.

Intestinal pain due to inflammation of the bowel can generally be distinguished from colic by the character of the pain and the difference in the tenderness on pressure.

The treatment of colic should be to remove the cause. If the cause cannot be discovered it is necessary to give the child relief at least temporarily. The best way, as a rule, is to give a salt-solution enema. Sometimes a dose of castor oil gives relief. Both of these means probably act by producing a general movement of the intestines and thus relieving the local excessive action. A mild carminative such as oil or essence of peppermint or wintergreen will also act in somewhat the same way. The baby should be kept warm, especially its feet. Sometimes a general warm bath will be necessary.

Urinary colic is frequently accompanied by symptoms of intoxication. There are often fever and respiratory disturbances. It is probably an important factor in many of the fevers of the new-born that are sometimes, without very good reason, called inanition fevers. It is best treated by giving large quantities of water by mouth and rectum.

Care of the Ears.—The external ears should be kept clean like all parts of the skin. There is very rarely occasion to interfere with the auditory canal.

Care of the Eyes.—Healthy eyes need no washing. There may be a slight irritation of the eyes for two or three days after birth from the Credé instillation (see p. 283). This will generally disappear of itself. If there is a slight watery discharge the eyes may be washed four or five times a day with a boric acid solution. The common practice of washing the eyes every morning is unnecessary and would better be omitted. There is no occasion to fear the mild light of a room. Probably an intense light, as the direct sunlight shining into the baby's face, would be unpleasant, as such a light is to any person. Light is not the cause of sore eyes, which are the result of an infection.

Ophthalmia Neonatorum.—Gonorrheal infection of the eyes of the new-born is the common cause of a serious disease that generally appears two or three days after birth, and unless well treated leads to blindness. This is the cause of half the blindness in the world. The germs of gonorrhea exist generally in a latent state in the vulva and get on to the face of the child during its passage out of the vagina. The germs get into the eyes when they are opened after birth. They soon set up a violent gonorrhea of the conjunctiva, with the formation of much pus. Frequently the lids stick together and pus accumulates in large quantities between them and the eyeballs. Soon the inflammation extends from the conjunctiva to the cornea, and here produces one or more thickened, opaque patches. When these patches are over the pupil the sight is lost. Sometimes there is deep ulceration, which may lead to perforation of the eyeball.

Every case of inflammation of the eyes must be reported at once to the attending physician, who will immediately institute treatment. A microscopical examination of a smear of the pus will determine the nature of the infection. If gonorrheal, frequently 2 or 3 drops of a 1 per cent nitrate of silver solution will be dropped into the eye as in the prophylactic Credé instillation (see p. 283). Sometimes a stronger solution is used with the dropper or on a swab. The eyes are then washed frequently, every half-hour to one hour, day and night, with boric acid or normal salt solution. This may be used with an eye dropper or, better, with an

irrigator. Between the washings ice compresses may be applied. Some physicians prefer hot compresses. Occasionally argyrol or protargol or some other albuminate of silver is used instead of nitrate of silver or in conjunction with it.

Non-gonorrheal infection of the eyes may result from contamination with colon bacilli or pneumonia germs or other germs found on the hands of the nurse or on the cloths used to wash or wipe the face of the child. This form of infection is not generally serious and is easily controlled by washing the eyes before each nursing with boric acid or salt solution.



FIG. 118.—Ophthalmia neonatorum.

Subconjunctival Hemorrhage.—A bright-red spot covering one-fourth or more of the front of the eye is due to a hemorrhage beneath the conjunctiva, caused perhaps by rupture of a minute vessel during birth. It causes no trouble and will disappear by absorption in two or three weeks.

Dress.—The child should be dressed so as to protect it from loss of heat and the changes of temperature which occur even in the summer season. Decorating a baby or making it look pretty, unless it can be done without interfering with

its health and comfort, should not enter into consideration. The method of dressing babies that is still not uncommon in this country, by which they are enclosed in three or four long, heavy, white skirts, while over the neck and arms is only a thin dress covered with lace, is directly opposed to the proper principles of dress. The mother often gives much time and labor to preparing a wardrobe that is quite unpractical because she has never had her attention called to the importance of warm, loose, comfortable clothing. Let her understand why all parts of the body should be protected, and why the baby should be dressed for comfort and not for show, and she will not only acquiesce in a common-sense outfit, but become enthusiastic over it.

Every object changes its temperature, that is, loses its heat or cold in direct ratio to the extent of its surface and not to its weight. For example, two blocks of ice that weigh 10 pounds each will melt quicker than one that weighs 20 pounds. A baby that weighs 7 pounds will lose in a given time much more than one-twentieth as much heat as an adult that weighs twenty times as much or 140 pounds. Moreover, the cooling off of a living body depends also upon the nature of the external layer. If the skin is lined with a good layer of fat, the body cools slowly. New-born babies have but little fat, and hence lose heat very rapidly. To conserve the vital energy of the baby it is therefore necessary to protect it well, not only the lower part of the body, but also the upper extremities.

For the first months of its life the baby should sleep most of the time and realize practically no difference between day and night. Its exhibition to relatives and strangers distracts its sleep and exposes it to changes in temperature as well as to dangers of infection. Let it lie undisturbed, both day and night, in clean, warm, loose garments, and it will thrive best.

As a soft, warm, absorbent material both for diapers and shirts, the Arnold knit goods, or garments of like pattern, can be recommended. The diapers, especially, have been so extensively advertised and sold that they hardly need any description. For its softness and absorbent properties it has perhaps advantages over any woven material. The

shaping of the diaper to fit the body by taking a gore in the center and folding across the gore is especially to be recommended, for it prevents the diaper from slipping and makes it fuller in the seat where the chief amount of material is needed. A peculiar soft, warm, cotton cloth now on the market, made especially for diapers, is cheaper than the Arnold knit goods, and is preferable to linen or cotton flannel. The small squares to be laid in the seat of the large diapers is a good addition for young babies. Unless the napkins are changed quite often the contents soak through and the skirt becomes wet. To prevent this at night, an extra napkin may be fastened around the body, but not bound around the thighs.

There are times when the rubber diaper might be used, for example, at a christening; but ordinarily it is objectional and should not be worn.

The short skirts are best made of cotton or cotton and wool, or silk and wool, so that they do not shrink too much. The stretcher is convenient to use in drying the garment.

If the baby is born in the warm season, stockings are not necessary, but in winter, unless the house is kept at an even temperature, they are often valuable. They are fastened to the diaper by safety pins.

In summer a long skirt of single thickness may be all the baby needs in the daytime, while at night the double garment is put on. In winter it is well to use both the single and the double garment. In this mode of dressing, the arms are protected as well as the body. An additional sleeveless skirt is quite unnecessary. Pinning blankets which hamper the exercise of the legs are not only unnecessary but undesirable.

In some hospitals a much simpler outfit is in use, and there is no valid reason why it should not be used in private houses. Such an outfit consists of a diaper and a sack-like garment without sleeves, that ties around the neck and extends below the feet. It may have a shirring string in the bottom so that the baby may be entirely enclosed in the bag. Such a garment has the advantage of keeping the hands and feet enclosed so that they cannot become cold and the baby cannot get its hands into its mouth or scratch itself. Its

simplicity and cheapness together with its other advantages makes its more general use advisable.

The bibs, to be worn continuously if the child regurgitates much, or otherwise only at feeding time, should be absorbent and from 9 to 10 inches long, large enough to be of value. Fine Turkish towelling is a good material to make them of.



FIG. 119.—Sack gown for new-born infant.

The house jacket is a very important garment. While the lower part of the body is enclosed in blankets, the arms and chest may be free and exposed. A short house jacket should be adapted to the temperature of the room. If the room is quite cool or if the child is exposed to drafts, a thick knitted jacket or a sweater is greatly to be recommended.

The outside jacket, the hood or cap, and the cloak, as well

as the shoulder blankets to wrap the child in when being carried about the room or from place to place, need no special description.

All clothing should be changed night and morning. The shirts worn one day may be aired and worn again unless soiled. The nurse is responsible for the care of the clothes. If she does not wash them herself she must see that they are washed properly. The Arnold goods, at least the diapers, require no ironing. Napkins soiled with feces must be washed out in cold water, rinsed, and then well boiled and rinsed again. When soiled with urine, they should be rinsed well with hot water.

Sleep.—Since the baby sleeps most of the time when it is not eating, its bed is an important matter. It should never sleep in the same bed with the mother, because the air is not so good, there is danger of the mother's lying on it, and it is apt to disturb the mother. If it is possible it should sleep in another room which can be warmed and ventilated to suit the baby. Frequently a temporary bed, suitable for five or six months, is made out of a large clothes basket or a basket made for the purpose is procured. A hood at the head is unnecessary and objectionable, as it interferes with good ventilation. This basket-bed may be placed on a low table or perhaps on a large chair. If it is in the mother's room it should stand in a protected part. At the bottom a small hair mattress is laid and covered with a piece of rubber cloth over which is spread a thick flannellette blanket or a comforter, and then a warm flannel blanket, which also lines the sides of the basket. The baby is then wrapped in a thick flannel blanket, or, in warm weather, perhaps in a shoulder blanket. In the warm season of the year or in a room well ventilated without drafts the baby gets better air and seems to enjoy itself more when it lies on the bed in daytime. Sometimes a child's crib is provided, before the baby comes. A rocking crib or cradle is unnecessary and objectionable. The ordinary crib with low sides answers very well for the baby, but is objectionable as soon as the baby is large enough to climb up, for then it is likely to fall head first out of the bed. For a child's bed, suitable also for older children, that

is, those a year or two old, a crib with some kind of a safety device that has sides high enough to prevent a child falling out, when it is old enough to stand up, is to be recommended. The open construction of such a bed also allows perfect circulation of air.

A baby needs no pillow. It may lie on the back, on either side or on its face. The latter position is often indicated when it has colic.

All bed-clothing should be well aired every morning while the baby is bathing or nursing.

Feeding.—In Chapter V, p. 242, it was stated that the baby should be given the breast secretion from the beginning, because the colostrum is nourishing and a proper food for the new-born, and because nursing is advantageous to the mother. Until the milk secretion is well established the baby may nurse, when the mother's condition does not contraindicate, every three or four hours if the baby is awake. Since the colostrum does not generally furnish liquid enough it is necessary to add water. For this reason the nurse should give the baby as much pure water as it will take, generally 2 or 3 teaspoonfuls at a time every two hours. Occasionally when it is necessary to get a large quantity of water into the system, as in anuria or urinary colic, sugar-water, 1 or 2 teaspoonfuls to the pint, may be given. Managed in this way, the baby will keep in good condition for the first two or three days of its life before lactation begins, and will not lose more than 6 to 12 ounces in weight.

If the breast is not very well developed and the baby does not take hold of the nipple well, or if the condition of the mother indicates a need for considerable rest, it is not good to annoy her at first too much with nursing the child. At no time should it be at the breast longer than twenty minutes.

After the milk has come the regular routine for the feeding of the baby must be determined and followed out. It is best that the baby should be fed with some regularity, both for the convenience of the mother and the good of the child. Although little lambs or calves may run to the mother every few moments it does not follow that it is a good plan

for children of civilized parents to adopt the same rule. Those mothers who nurse their babies every time they cry, thinking they are hungry, may become martyrs to the practice. On the other hand, an unvarying insistence upon a two-hour or a three-hour rule may also become a tyranny, and may be quite unnecessary.

It is important to study the child's needs. While some children ought to be fed every two hours, others, because they have larger stomachs or obtain more milk, go very well three or four hours between nursings. To make a two-hour child go three or four hours without nursing will torture and harm it, while to wake a four-hour baby and insist upon its nursing every two hours will tire out the mother and nurse.

The best index of the sufficient feeding of a child is its growth. If it gains properly from day to day or from week to week, that is from $\frac{1}{2}$ ounce to 2 ounces a day, or from 4 to 10 ounces a week, it gets enough to eat, although there may be some fault in the composition of its food that causes colic. On the other hand, although a baby may be very good and quiet, yet if it loses in weight or stands still it is not getting sufficient food. Hence it is important that the baby should be weighed as accurately as possible from time to time.

A scale that will weigh to ounces at least is very desirable. A lever balance with separate weights or with a sliding weight is most satisfactory. If no such scales are accessible, however, a spring balance is better than nothing.

A child should always be weighed under the same conditions as respects its mealtimes. The best way is to weigh it naked in the morning immediately after its bath. The weight should always be recorded.

If question arises as to the sufficiency or amount of mother's milk it may be answered by weighing the child before and after nursing, provided sufficiently delicate scales are used. It is not necessary to take into account the clothes of the child if they remain the same in both weighings.

A normal child, to make a satisfactory gain in weight, will generally need from one-eighth to one-tenth of its weight of mother's milk every twenty-four hours. A premature child

will require proportionally more (see p. 323). Ordinarily one may determine, in the course of four or five days, the proper routine for the nursing of the baby. If the child is very weak or premature it may be necessary to nurse it oftener than once in two hours. In the case of a fairly well-developed child this is the shortest period. About half of all babies may be fed every two and a half to three hours



FIG. 120.—Baby scale.

during the daytime, that is, from seven to eight o'clock in the morning until eight to ten o'clock at night. During the night, of course, the child is allowed to sleep all that it will. During the daytime it should be awakened at the nursing time, when the proper interval has been established. In the rest of the cases it may be found desirable to let the baby nurse every four hours.

Ordinarily the baby gets sufficient milk from one breast, and it is convenient for the mother to nurse the breasts alternately. If, however, the child does not get sufficient from one breast it is best to give both at one time. This is a good practice, as it stimulates the breasts, and thus increases the amount of milk secreted by them. It should not remain at the breast longer than fifteen minutes or at the most twenty minutes. If it holds the nipple too long in the mouth the nipple becomes macerated and more easily wounded. Besides, the mother is exhausted.

Occasionally a child is unable to obtain sufficient milk from the breast, either because the milk does not flow well through partly obstructed or very small milk ducts, or the nipples are depressed or small or hard to grasp, or because the baby is too weak to make any nursing efforts. This trouble generally confronts us during the first four or five days of the child's life. If the child can be nourished for a few days it will become strong enough to get milk from the breast, if the mother has a sufficient secretion for it. In these cases the nurse must get the milk from the breast and feed it to the child. At first she may be able to obtain only a teaspoonful at a time; after a day or two she can generally get 3 or 4 teaspoonfuls. The milk can be gotten by carefully milking the breast with the hands. Sometimes a breast-pump may work better, but, as a rule, a skilful nurse can do as well with the hand as with the pump and cause less pain. When possible, if the mother is not diseased, a more vigorous healthy baby may be applied to stimulate and develop the breasts. The milk can be collected in a small cup, warmed by setting the cup into a large vessel of hot water, and fed to the baby with a teaspoon. If only a teaspoonful of milk can be obtained at a time it may be necessary to feed the child each hour. Sometimes the physician may order a little stimulant to be added to the milk, a drop or two of brandy. In these cases it is desirable to give the baby as much sweetened water as it will take, for sugar and water are important elements of the child's food. While the child is thus fed it should be put to the breast every three or four hours in order to try and discover if it will not nurse.

After it begins to draw from the breast it should still be fed on the mother's milk with the spoon until the mother and nurse are convinced that it gets sufficient by nursing.

When no milk can be obtained from the breast for several days it may be necessary to feed the child something more than sweetened water. Sometimes because of sore breasts or on account of sickness of the mother artificial feeding temporarily or permanently must be resorted to. The physician will of course prescribe the food and the method of preparing and giving it.

In order to understand why cows' milk, which would seem to be the most natural food for children, may not be a good food for young babies, we must, for a moment, study its composition and compare it with woman's milk. As is well known, milk is a complex food containing, besides water and certain mineral salts, sugar, *i. e.*, milk-sugar, fat, *i. e.*, butter, and proteid substances, one of which, casein, is the important part of cheese. Milk is normally curdled in the stomach juice. The kind of curd that is formed by milk depends upon the amount and kind of proteid that is present in it. Cows' milk differs from woman's milk in having a larger proportion of casein. Moreover the casein of cows' milk forms a denser, tougher curd than does that of woman's milk. Hence it follows that if unchanged cows' milk be given to babies, tough indigestible curds may be formed which can cause stomach and bowel disturbances.

To change the cows' milk so that it will answer better for an infant's food, water is added to dilute the proteid. This dilution, however, makes the milk poor, as it diminishes also the proportion of sugar and fat. To counteract this objection, fat, in the shape of cream, and sugar are added to the diluted milk. What amounts to the same thing for small babies as diluting milk and adding cream is diluting cream.

In order to see more clearly the changes that take place by this process of modifying milk, let us look at the composition of woman's milk and cow's milk and cream.

Woman's milk contains in 100 parts:

Proteids	1 to 2 parts
Sugar, about	6 parts
Fat, about	3 parts

Cow's milk contains in 100 parts:

Proteids	3 to 4 parts
Fat, about	4 parts
Sugar, about	4 parts

A good cream will contain in 100 parts:

Proteids	3 to 4 parts
Fat	16 parts
Sugar	4 parts

Now it will be seen that when we dilute this cream with three times its bulk of water the mixture will contain in 100 parts:

Proteids, about	1 part
Fat	4 parts
Sugar	1 part

If to such a mixture milk-sugar or dextrose be added to make it as sweet as ordinary milk we will have a food very nearly approaching the composition of mother's milk. This is a good substitute for breast milk for young infants.

It is, of course, important that the cream used in making this modification should have a definite composition.

Such precautions are taken, in the production and care of certified milk and cream, that it reaches the consumer very little contaminated and can be given to the child without sterilizing.

The ordinary market milk is not so carefully handled and is generally considerably contaminated when it is delivered, so that it should be sterilized always before it is given to infants. Boiling is the simplest way of sterilizing. The mixture is put into an enamelware basin and carefully boiled for three to five minutes on a stove or over a gas flame. Of course care must be taken not to burn the milk. The water that is lost by evaporation should be replaced or, better, a sufficient extra amount of water should be added beforehand to leave the proper quantity after evaporation. The milk may also be put into nursing bottles and sterilized by steam in an Arnold or a similar steam sterilizer. Careful boiling, however, answers every purpose and for the small amount

generally needed temporarily with infants it is perhaps preferable.

In many cities and large towns there are dairies that produce milk under such conditions that it is practically sterile and needs no boiling. This is the certified milk that is produced in accordance with the rules made by milk commissions established by medical societies. Such milk is also of definite composition and should always be preferred when it can be obtained.



FIG. 121.—Siphoning lower milk to leave top milk in bottle.

Another method of modifying the chemical composition of milk is to use a certain amount of the top milk of a bottle obtained by siphoning off the lower portion of the milk. The upper 8 ounces of a pint of milk will contain nearly all the fat and hence would have about the following composition: proteids, 4 per cent; fat, 7 to 8 per cent; sugar, 4 per cent. This diluted with a pint of water would have 1.33 per cent proteids and 2.33 to 2.66 per cent fat. This sweetened properly by adding a well-rounded tablespoonful of cane-sugar gives the proper proportion of carbohydrates

and is a very good mixture for supplementary feeding of a new-born child.

The quantity that should be given to a child depends upon its age and condition and upon the frequency of feeding. During the first two weeks $\frac{1}{2}$ to 1 ounce may be given every two hours, while during the next two weeks 1 to $2\frac{1}{2}$



FIG. 122.—Good and bad nursing bottles: 1, ordinary small-neck nursing bottle as sold in drug-stores (8-ounce); 2, improved large-neck nursing bottle (made in 5- and 10-ounce sizes); 3, Hygeia nursing bottle.

ounces may be given every two or three hours. The milk may be given with a spoon or with a nursing bottle. If the artificial feeding is temporary it is better to use a spoon. Even when a child is fed continuously there are some advantages in feeding with a spoon. The chief advantage is the absence of danger of contamination of the nursing bottle. The bother of cleaning properly the bottle and nipple is

also avoided. If a bottle is used the Hygeia bottle can be recommended (see Fig. 122) as one that can be thoroughly and easily cleaned. If the ordinary nursing bottle is used it must be cleaned with a bottle brush and boiled after each feeding. The care of the nipple is the same as the care of the breast shield (see p. 255).

If for any reason the physician prefers to use some other kind of food than modified milk he will prescribe the method of its preparation and the quantity to be used, or the nurse will rely upon the directions which accompany the packages. The other substitutes for mother's milk, like condensed milk or the various infant foods, are not so extensively used now-

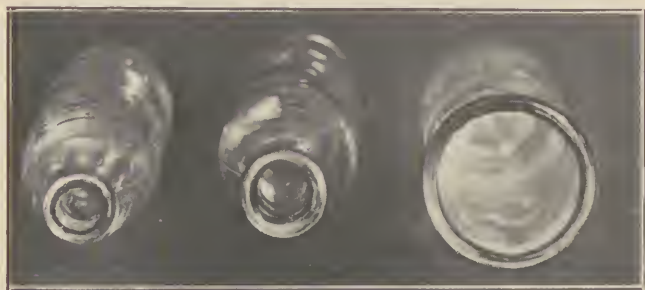


FIG. 123.—Showing comparative sizes of necks of bottles shown in Fig. 122.

adays as they were before the methods of sterilization and modification made cows' milk available. Some of the foods are often used, however, in the modification of cows' milk either in place of sugar to help sweeten it or to improve its digestibility.

Premature Children.—The death of three-eighths (37.5 per cent) of all children that die during the first month of life is attributable to prematurity; 15 per cent more die because of congenital debility, which is no doubt assigned as the cause of death in many premature children. From these two causes about 70,000 children die every year in the United States. This fact shows the very great importance of this subject.

Definition of Prematurity.—A child is premature if it is born before forty weeks from the date of conception. Frequently however, we cannot determine the exact duration of life in the uterus and hence we may say that a child is premature if it weighs at birth less than $5\frac{1}{2}$ pounds and is less than 48 cm. or 19 inches long.

Dangers to Which Premature Children are Exposed.—The chief dangers to which the premature infant is exposed are chilling and starving. Unless great care is taken immediately after birth to keep the baby warm, its temperature will fall in a half hour to 93° F. or under. Unless the child is quickly warmed it will be seriously injured. A temperature of 90° is apt to prove fatal. This rapid cooling is due largely to the fact that the surface of the body is relatively much greater in proportion to the weight than in adults or large children, and hence the radiation of heat is much faster. Also the absence of a protective layer of fat in the skin favors a dispersion of heat. Moreover the nerve centers which control the heat production and loss are apt to be unstable.

To prevent the chilling immediately after birth the child must be kept well covered until separated from the mother and then put at once into an incubator or a very warm room. If it should become cold it must be put into a warm bath of a temperature of 102° to 105° F. and its rectal temperature raised to normal.

Home or Incubator Station.—If the child is born at home and can receive there proper nursing and incubation arrangements should be made at once for its future care if this has not been attended to beforehand. When the home surroundings are such as to make the proper care doubtful the child and if possible the mother should be sent to an incubator station. Such a station should be in connection with a maternity hospital or a maternity ward of a general hospital, so that the proper food, mother's milk, may be secured in case the mother is dead or her milk fails or if for any reason she cannot accompany her child to the station. In transporting the baby it should be warmly wrapped, and if necessary, carried in a large basket, which may also contain hot-water bottles or bags.

Warm Room.—To keep the child warm it must stay either in a warm room or in an incubator. If a small room is available that can be kept at a temperature of about 85° F., with moist fresh air nothing better can be asked. As such an arrangement is rarely possible we must generally rely upon an incubator.

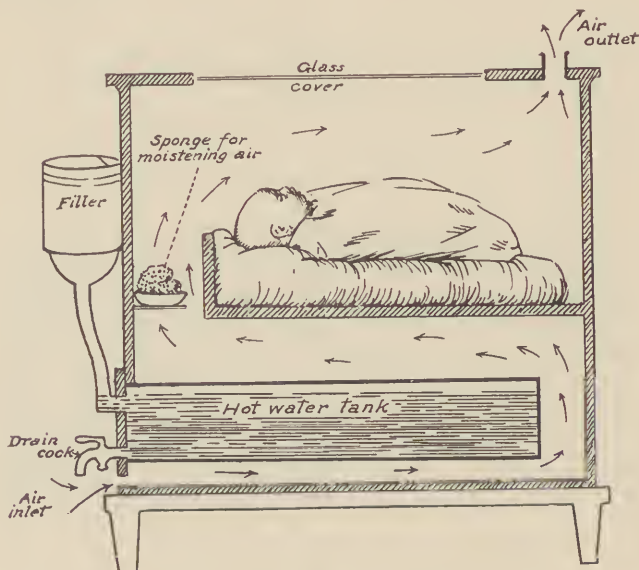


FIG. 124.—Diagram of incubator.

Incubator.—An incubator for children is simply a box or small chamber in which the child lies surrounded by a continually changing current of fresh, warm, moist air. Elaborate electrically heated incubators may be desirable in an incubator station. A simple and good kind, especially for private houses or small hospitals, is represented in Fig. 124. The box, 17 x 19 x 22 inches, has in the bottom a large tank capable of holding 8 quarts of hot water. This tank is connected by a tube with a small filling reservoir on the outside of the box and emptied through a spout closed with a stop-cock which comes from the lower part of the tank. Under-

neath the tank is a shallow air space into which air enters from the outside through holes in the end of the box. The current of air passes under the tank, around its end, over the tank and under the shelf on which the baby lies, then around the shelf over the baby and out of the hole in the cover. A small revolving windmill may be inserted into this opening to serve as an indicator of the pressure and strength of the air current, but is not necessary. A basin attached to the side of the box, holds a wet sponge which moistens the air. A thermometer on the shelf beside the baby indicates the temperature of the interior. A glass door is in the top of the incubator. The air admitted to the incubator may be taken from the room or by means of a tube from the outside of the house. As the ventilation or the velocity of the air current will depend upon the difference in the temperature of the air before admission and that of the incubator it is well that the room be not too warm or that the air be supplied from the outside of the house.

The temperature of the incubator is kept constant by withdrawing 2 to 4 quarts of water from the tank every two to four hours and replacing it with boiling water. The temperature of the room and of the admitted air determine the quantity of boiling water needed and the frequency of the change.

The temperature of the inside depends upon the needs of the child. A very frail and small child weighing less than 4 pounds may require at first a temperature of 90° F. As it grows the temperature may be gradually reduced. A child weighing 4 to 5 pounds may start with an incubator temperature of 87° F. It should keep a normal rectal temperature without sweating. Gradually the temperature of the incubator may be reduced to 80° F. By this time the child is left out of the box a considerable part of the daytime and returned to it at night.

When a child is vigorous and develops rapidly it may be necessary to keep it in the incubator only a few days, while a puny child may require it two or three months.

It is frequently necessary or desirable to remove the child from the incubator to feed it. The room temperature should

not be below 70° F. for feeding or below 80° F. for cleaning and dressing, and it should be wrapped in warm blankets as much as possible while outside. The breathing of colder air for five or ten minutes may act as a tonic, while a long, thorough cooling would be fatal.



FIG. 125.—Hess water-jacketed infant bed.

The incubator must be kept clean, else it may become a source of infection. It should always be thoroughly disinfected before receiving a new patient. If in use for some time it should be thoroughly cleaned every three to four days.

Hess Incubator.—This is a warm-jacketed tub, in which the water in the jacket is warmed by electricity. For a hospital as well as for a private house where the cost is not prohibitive it is the best incubator on the market because

it is simple, affords good ventilation, and the greatest facility in watching and caring for the child.

Feeding.—The second danger to which the premature infant is especially exposed is starvation. It needs relatively a large amount of food while its digestive system is not very well developed. If it gets too little food it starves; if it gets too much or improper food, digestive disturbances arise. Woman's milk is almost absolutely essential. If it cannot be obtained from the mother it should be procured from some other nursing woman. If necessary such milk can be collected in small bottles, kept cool, and transported like cows' milk. Feeding should begin at birth and the amount given increased as rapidly as possible until the normal amount for the child is reached. As a general rule a premature child requires per day about one-sixth of its weight of good average milk to supply its needs and make the proper gain in weight. It probably will be necessary to begin with 2 or 3 ounces a day and increase to the normal quantity in the course of a week. The number of feedings per day will depend upon the quantity that can be given at a time. Sometimes the child can retain only $\frac{1}{2}$ to 1 dram, and then it should be fed each hour, day and night. Later, as it can take a larger quantity at a time, the number of feedings a day is diminished.

As the premature infant cannot ordinarily nurse and because nursing, even if possible, might be undesirable on account of the danger of exposure, it is best to feed the child with a dropper or with a feeder such as represented in Fig. 126. Occasionally a small catheter introduced into the stomach through the nose has been used as a stomach tube for gavage, but the patient use of the dropper or feeder is preferable. When the child is able to nurse it should be weighed on an accurate scale before and after nursing to determine the amount obtained so that a deficiency can be made up by feeding. After feeding, the child should be carefully watched in the incubator for some minutes on account of the danger of regurgitation which might cause choking.

Oxygen for Cyanosis.—During the first two or three days of its life the premature child is in danger of asphyxia due often to atelectasis or imperfect dilatation of the lungs and manifested by cyanosis. This is best treated by the administration of oxygen. When the child is in the box-incubator the tube from the oxygen tank may be introduced into one



FIG. 126.—Breck's tube for premature infants. (Koplik.)

of the air-holes and, if necessary, one or more of the other holes closed. The color of the baby's face is the index of the cyanosis and determines the amount of oxygen needed.

Dressing and Bathing.—In the incubator the child needs but little clothing, a diaper and a bag gown (see p. 307). It should lie on a thick layer of absorbent cotton. It can generally be removed from the incubator for cleaning and a

daily warm bath can be given provided the temperature of the room can be brought to 90° F. Otherwise it is probably better to oil the baby in place of a full bath.

During the first days of its life the temperature of the child may fluctuate rapidly. In this case the room in which the child is cared for and the bath should be kept in constant readiness. If the child's temperature falls much below normal it should be put into a warm bath of about 103° F. until the temperature rises to normal. If the temperature of the child is 103° F. or more it should be put and kept in a cooling bath of about 96° F. until the fever is controlled.

Subsequent History of Premature Children.—Data show that the chance of life of the premature child is equal to that of the full-term child if the former is cared for properly and not discharged until it is as large as a mature infant and receives thereafter reasonable care. Its future prospects for a healthy and well-developed physical and mental organism are equal to those of a child carried to term.

Incubator for Other Debilitated Conditions.—Children injured during birth and those born partially asphyxiated are often in a precarious condition for some days and can be treated with advantage in an incubator and along the lines laid down for the management of premature children. Atelectasis, bronchitis, and acute lung infections are also cases for incubator care.

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NOTE.—Since the meaning of practically all the words used in this book can be determined from the text and context, a glossary is omitted in the belief that the index freely and properly used will supply its place.

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